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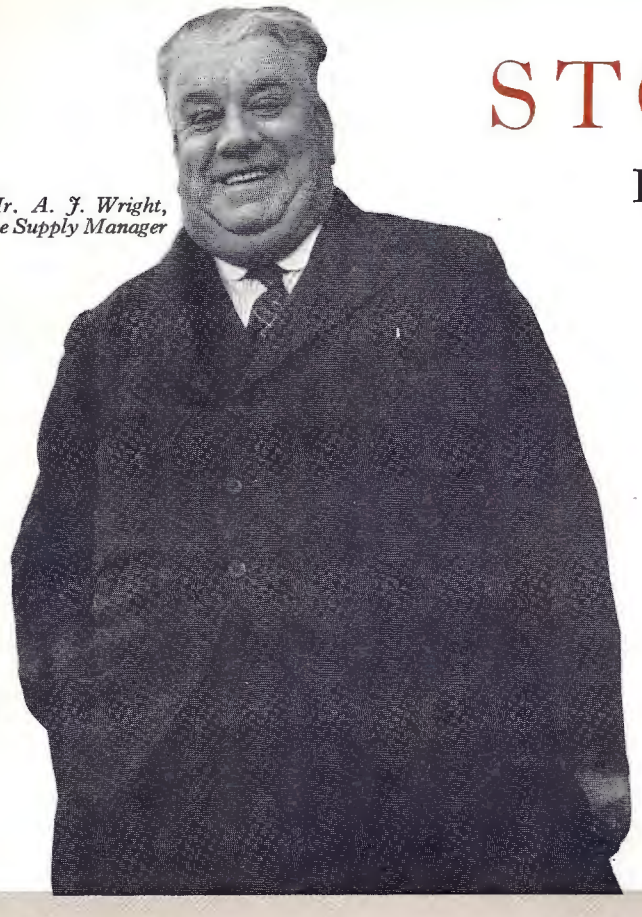


Mr. A. J. Wright, the Supply Manager

THE I.C.I. MAGAZINE

VOLUME 28 NUMBER 161 MARCH 1950

The *I.C.I. Magazine* is published for the interest of all who work in I.C.I., and its contents are contributed largely by people in I.C.I. It is edited by Henry Maxwell and printed at The Kynoch Press, Birmingham, and is published every month by Imperial Chemical Industries Limited, 26 Dover Street, London, W.1. Telephone: REGent 5067–8

CONTENTS

Front cover photograph: "Impending Storm."

Back cover photograph: South Choir Aisle, Wells Cathedral, by G. Parker (Metals Division).

The Editor is glad to receive articles for publication. Payment will be made for accepted contributions. A preliminary letter is usually advisable.

STOWMARKET

Personalities of today

IN 1861 Thomas Prentice & Co. founded a factory at Stowmarket for the manufacture of guncotton. It was almost the first intrusion of industrialism into the quiet countryside of Suffolk; and even today the factory, one of four under the command of Paints Division, cuts something of a lonely figure in a predominantly farming community. Yet for all its seclusion it has had a lively history.

One hot August afternoon in 1871 several tons of guncotton exploded, wrecking all the buildings with the exception of a chimney shaft. However, manufacture of explosives continued steadily under the New Explosives Co. until during the first world war a rapid expansion took place, so much so that more than 3000 people (as against the 620 of today) worked there, travelling by special trains from other Suffolk towns.

At the end of the first world war Nobel's Explosives Co. Ltd. acquired a controlling interest in the Stowmarket works, and thereby brought much-needed support during the difficult post-war years. Things revived in 1926 when the manufacture of nitrocellulose finishes for motor cars was begun under the famous 'Belco' trade name. Business steadily expanded up to the outbreak of the second world war, when sudden efforts were called for to meet new demands. Stowmarket developed the production of camouflage paints, aircraft finishes and the rubber solution used for self-sealing fuel tanks.

The Stowmarket prize for family records goes without question to the nineteen members of the Paddy family, who in the course of three generations have come to work at the factory. Harry Paddy, who was himself the eldest son of a family of twenty-one, came to Stowmarket from Cornwall in 1898 to supervise the starting up of a new cordite plant, and within three months he became foreman in charge of the production of cordite and sporting ammunition powders. During the 1914–18 war Mr. Paddy helped to produce the first smoke bombs to be made in this country and in 1926 became the first foreman of the 'Belco' plant.

Four of Harry's daughters were employed in the old explosives factory, and of his other seven children four sons and a daughter have come to make paint at Stowmarket. Bill Paddy is a leading hand with 36 years' service in the Dehydration Department, Percy Paddy is a fitter and Bob an assistant foreman in the 'Belco' Department. In addition, there are two of Harry Paddy's sons-in-law—Arthur Hart, the plant foreman on G Site, and Wally Boast, a leading hand in the 'Belco' Department, while another son-in-law, the late Bert Wiggins, was a colour matcher for a number of years. Of Harry's grandchildren, Hazel is now a member of the Distribution Department, Allan Hart was in the 'Belco' Department until called up for war service, Rita, until her

Arriving for work in the '90's. Workers are being asked to hand over matches to the doorkeeper

recent marriage, worked in the canteen, and Elsie worked in the Distribution Department before she also left to get married, while her husband Cliff Reynolds also worked at Stowmarket until recently. The latest recruit from the family is Kenneth Paddy, who joined the Export Department last July.

One of the oldest and most popular personalities at Stowmarket is Mr. A. J. Wright, the Supply Manager, who can claim fifty years of service. He joined the factory in 1900 as an office boy, soon becoming a wages clerk and a few years later a costs clerk. The rate of pay in those days was 3½d. an hour.

In 1920 Mr. Wright became storekeeper and was made responsible for the disposal of surplus war equipment. Shortly before a sale one afternoon he happened to open the drawer of a small desk and found it contained nearly three pounds of special laboratory utensils made of platinum, which in those days was worth £26 an ounce. The desk, with its treasure trove removed, was knocked down a few minutes later for 3s.

Eight of the nineteen members of the Paddy family

Mr. Eric Mayhew, back at Stowmarket from Germany through the Russian lines

Escape through the Russian lines was one of the wartime adventures of Mr. Eric Mayhew, who started work at Stowmarket in 1935. In 1940 Mr. Mayhew joined the Royal Marines and went out to fight in Egypt and took part in the defence of Crete, where he was taken prisoner. He spent the rest of the war in a camp in Sudetenland working on the railways, the land, and for a few months in a cotton factory. Three times he tried to escape, more to relieve the monotony than with any hopes of getting completely away, which was almost impossible for P.O.W.s in Czechoslovakia, the very centre of enemy territory. In the last days of the war he and his fellow prisoners released themselves and made their way home through the Russian lines, "where," he says, "no one seemed very particular whether they shot us or not."

In charge of a machine looking rather like a baker's dough mixer but known, we are told, as a W.P. incorporator is Mr. Jimmy Rose. Today his machine kneads nitrocellulose into various mixtures, but when he first came to Stowmarket in 1907 he used the same type of machine to make cordite. In 1914 he passed from making cordite to using it when, as a "Terrier" of several years' service, he was called to the colours in the Suffolk Regiment. He took part in the Dardanelles campaign and was among those evacuated from Gallipoli who fought in the battles for Egypt and Palestine, culminating in Allenby's great march on Jerusalem. After the war he re-enlisted for service in the Canal Zone and finally returned to Stowmarket in 1928. Mr. Rose was a works councillor for two years and is an enthusiastic member of the bowls section of the Recreation Club. He has won all the bowling cups except the singles trophy, although he has been in the final no fewer than five times.

It is a far cry from keeping paint formulae records to building your own house, but in the short time that she has been at Stowmarket Mrs. M. V. Caley has managed to combine them both. She started work in the factory in 1942 printing labels but before long was transferred to her present job in the 'Necol' Plant office, where she looks after the records of the laboratory secrets of I.C.I. paints.

In May 1947 Mrs. Caley and her husband decided that the only way to get a home in Stowmarket was to build one. Mr. Caley had been a bricklayer some fifteen years before but had had no other experience of the building trade, while Mrs. Caley was quite unversed in it. Nevertheless some eighteen months later they were able to move into a comfortable six-roomed house, complete with plumbing and electricity, which they had planned and built entirely themselves, from foundations to the topmost tile, in their spare time.

Mr. Jimmy Rose, paint mixer

Mrs. Caley. She and her husband built with their own hands their house, "Wee Dunnitt"

Mr. Bill Barnard, leading hand

primers (then known as collodion) for the Nobel's Explosives Company at Ardeer. He relates how the mixture was hand stirred in an earthenware pot with a wooden paddle. There was great excitement in the works, and everyone stood around with their mouths open as if something

Miss D. D. Fisher, who works in the Dehydration Laboratory, is one of the many women at Stowmarket who during the war sacrificed their home life and put their hands to heavy work normally done by men. One of her jobs was to load the dehydrating machines with nitrocellulose.

Mr. Bill Barnard, now a leading hand in the ball mills of the 'Necol' Plant, has had a most interesting and varied life. Before he came to the factory in 1940 as a storekeeper he had been a road foreman for more than seventeen years. Before this he had worked his way through the hotel business from "boots" to manager. He was born and bred on the land and still recalls with some regret how he could come home from the fields soaked to the skin every night of the week without ever taking cold.

Mr. E. C. Murray (works manager) started work at Stowmarket in 1910 as a laboratory assistant testing sporting ammunition powders. He remembers the first production of waterproofing solution made from nitrocellulose and ether-alcohol for guncotton

Miss Fisher at work in the Dehydration Lab.

wonderful was going on. When the 1914–18 war broke out the factory started to make dope for aeroplane fabrics and soon was so overwhelmed with government contracts that they had to start working shifts even in the laboratories.

Early in 1917 Mr. Murray joined the Experimental Station of the Royal Naval Air Service, which was then under the command of that well-known figure, Commander Brock, of firework fame. Looking back, Mr. Murray feels that he spent most of his time pushing smoke containers off the prow of a destroyer travelling full tilt across the North Sea, hoping that he wouldn't go with them.

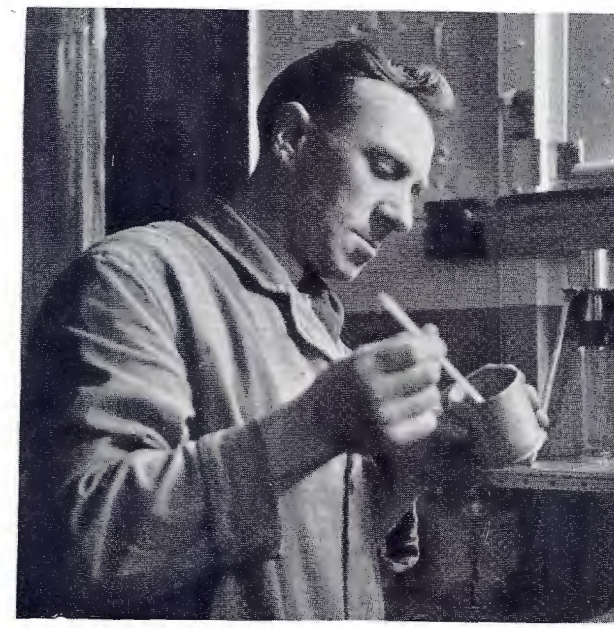
Two tins of the same kind of paint must not only exactly match each other but they must also be of a uniform consistency, and this is where Mr. S. C. Hillier of the Viscosity Testing Laboratory comes into the picture. Mr. Hillier, a comparative newcomer to the works, came to Stowmarket in 1947. Before this he was manager of a butcher's shop in the town, but the poor quality of meat and the "coupon business" rather took the wind out of his sails.

Staff and labour matters at Stowmarket are dealt with by a single department, under the care of Mr. A. G. Addison, the Personnel Officer, who has had practical experience of both office and manual work. Mr. Addison started his career at the age of 18 as a schoolmaster deputising for those who were ill or on holiday, but it was only a part-time job. Taking the advice of a friend, he joined the old Stowmarket silk works as a wages clerk. When the slump came in 1930 the silk works were closed down, and for the next six years Mr. Addison turned his hand to all kinds of jobs, mostly on the land or as a lorry driver. For loading sugar beet in the yard of the beet sugar factory at Bury St. Edmunds he was paid the handsome sum of 6d. per ton, and for this he had to unload some of it as well. One day he and three workmates moved no less than 100 tons. He returned to the works in 1936 as a clerk in the Cost Office and five years later took charge of the premium bonus section. He became Personnel Officer in 1946.

As secretary of the Stowmarket branch of the W.E.A. Mr. Addison still maintains his interest in teaching. He is also a keen fruit and vegetable grower and last year carried off several prizes in the factory's first horticultural show. In 1948 he set up something of a record with a whip-rooted carrot 63 inches long.

The best of several war stories which Mr. Addison has to tell is of the scene which took place one morning outside the bank in the market square. A staff car, a jeep and an escort of six military police on motor-cycles waiting in the square suddenly sprang into life. The bank doors opened and two men in full battle order carrying sub-machine guns sprang out. They were followed by two officers, also armed to the teeth, who staggered out of the bank with a heavy bag, which they bore to the waiting staff car. Bag and officers were no sooner inside than the machine-gunners mounted the running boards and the whole convoy was off, with sirens screaming, at breakneck speed. It was pay day in the American Army!

Mr. E. C. Murray, the Works Manager



Mr. S. C. Hillier of the Viscosity Testing Laboratory

Mr. A. G. Addison, the Personnel Officer

I.C.I. NEWS

U.S. SCHOLARSHIPS

Nine members of the staffs of I.C.I. Divisions have been successful in obtaining E.C.A. scholarships to the United States. They are: C. G. Allner, A. D. Sharpe and J. E. A. Steward (Alkali Division); P. G. Harvey (Billingham Division); V. W. Morris, G. T. Parker and C. J. Skinner (General Chemicals Division); P. J. Butcher (Nobel Division); and N. Charnley (Plastics Division).

Most of the scholars have already left for the United States. The scholarships, of which there are 50, last for one year and are financed under Marshall Aid. Their object is to enable British honours graduates in science or engineering to take courses of post-graduate instruction in selected American universities and institutes of technology, combined with short training periods in factories to learn American production methods.

BILLINGHAM DIVISION

Pakistan Mission

Dr. G. I. Higson, joint managing director of Billingham Division, recently arrived in Pakistan on an industrial mission under the chairmanship of Lord Burghley. He is the representative of the chemical industry on the mission.

The mission's terms of reference are to explore and report to the Government on the steps which might be taken to assist the flow of trade in both directions between Britain and Pakistan, and particularly on the way in which British interests could assist further in the planning and execution of schemes which the Pakistan Government have under consideration for the economic development of their country and the expansion of trade.

Mr. Norman Sturdy's Award

Mr. Norman Sturdy, senior chargehand of the Anhydrous Ammonia Filling Station of Billingham Commercial Works, has been awarded the British Empire Medal in the New Year's Honours List. He started work at Billingham nearly twenty-three years ago, and joined the Anhydrous Ammonia Filling Station in 1929. Last year the station's output reached the record figure of 4800 tons, of which 1830 tons went for export.

Mr. Norman Sturdy is congratulated by his colleagues

A lifelong athlete, Mr. Sturdy has been a member of Synthonia's Athletic Section for many years and has held the long-distance cross-country and two-mile walking championships.

GENERAL CHEMICALS DIVISION

Retirement of Mr. John Lowe

The retirement of Mr. John Lowe from Pilkington-Sullivan Works at the end of 1949 severs one of General Chemicals Division's few remaining links with the last century. Mr. Lowe started work at Sullivan Works in 1898 as a patternmaker, a craft of which he soon proved himself master. At the farewell gathering held in the Joiners' Shop a presentation was made to Mr. Lowe on behalf of the many friends he has made in the Division during more than half a century's service.

3500 Years' Service

A total of 3500 years' service was represented by some ninety pensioners who attended last year's Christmas pensioners' party at Cassel Works. They included six pensioners with fifty or more years' service each—Messrs. Curry (56), Peacock (51), Liddle (51), Overton (50), McCarron (50) and Brooks (50)—who kept each other very busy exchanging reminiscences.

HEAD OFFICE

Retirement of Mr. C. S. Robinson

Mr. C. S. Robinson, a well-known personality throughout I.C.I., both at home and in South Africa, retired on 31st December to the great regret of his many friends.

After more than six years' service spent as assistant works manager of the Cape Explosives Works in South Africa, Mr. Robinson joined Nobel's Explosives Co. in 1925 as Superintendent of Acids and Chemicals, later becoming Chemist Assistant Manager. In 1929 he joined the Company's Technical Department in London. From there he went to Billingham, where he became joint managing director in 1935, and in the same year was appointed Managing Delegate Director of I.C.I. (Fertilizer and Synthetic Products) Ltd. He became chairman of General Chemicals Group in 1939.

During the war Mr. Robinson was seconded to the Ministry of Supply and became Director-General of Filling Factories, where an enormous increase in production was effected under his direction by the introduction of an incentive bonus scheme. He was awarded the C.B.E. in 1943 for his services in this connection. After a short period with the Control Commission in Germany, he returned to London to serve on the headquarters staff of I.C.I. He was a member of the Royal Commission on Equal Pay set up in 1944. With his departure the Company loses an administrator of high reputation.

Mr. C. S. Robinson

U.S. Packaging Methods Examined

Mr. G. M. Ashwell, president of the Institute of Packaging and I.C.I. Chief Packaging Adviser, returned recently from the United States with the team of specialists sent by the Anglo-American Council of Productivity to examine the ways in which American goods are made up for retail sale and display.

Some of the questions to which they tried to find answers in the United States were: Do American industries rely on their own staffs for the design of their packages, or do they make use of consultants? What relation does the cost of the package bear to the selling price of the packed article, and what does packaging add to the proportion of indirect labour employed? Can there be an after-use of containers? Should British goods destined for the American market be made up in an American fashion or should British industries exploit distinctive ways of their own?

A New Rifle Club

A rifle club has recently been formed at the Butterwick Research Laboratories and is affiliated to the N.S.B.R.A. as Club No. 1786. The club would like to arrange postal matches with other I.C.I. rifle clubs, and any club interested is asked to write to Mr. H. G. Hemming, the secretary, at The Frythe, Welwyn, Hertfordshire.

I.C.I. (INDIA)

Mr. I. D. Khosla

News comes from I.C.I. (India) of the recent presentation of the Long Service Award of a gold watch to Mr. I. D. Khosla, the assistant in charge of the Amritsar Sales Office and the first member of the staff of I.C.I. (India) to have completed 25 years' service.

The presentation, which was made by Mr. W. A. Bell, the chairman of the company, took place at the garden party given at the home of Mr. Royston Brown, the manager of the Kanpur Division, and was attended by some twenty-five members of the staff.

The photograph opposite shows (in front) Mr. Royston Brown (manager, Kanpur Division), Mr. W. A. Bell (chairman, I.C.I. (India)), Mr. I. D. Khosla, Mrs. Royston Brown, and Mrs. C. A. Hurley (manager's secretary); (behind) Mr. R. K. Jerath and Mr. R. N. Bailey of the Kanpur Division

Mr. J. E. Broomhead

LIME DIVISION

Mr. J. E. Broomhead Honoured

Mr. J. E. Broomhead, works manager at Hindlow Kilns, was awarded the M.B.E. in the New Year's Honours List. Mr. Broomhead, who is 62, has been in the limestone industry all his working life. He took his first job in a quarry at the age of 13. He joined the staff of Hindlow when the present battery of patent kilns—the biggest lime-producing unit in the country—was opened in 1929. He has devoted much of his time to the study of fuel economy, and his many years of experience in this field were invaluable in helping to overcome wartime fuel shortages and in dealing with the crisis which arose from the blizzard in 1947.

As assistant manager at Hindlow Mr. Broomhead was one of those who welcomed H.M. the King, then Duke of York, when he visited the works in 1933. Among the many letters and telegrams received by Mr. Broomhead when the news of his award was announced was a letter from the Chairman, Lord McGowan, written from Cairo.

METALS DIVISION

Retirement of Mr. C. B. Bass

With the retirement of Mr. C. B. Bass after nearly 43 years' service Metals Division loses an old and trusted friend who has spent a lifetime in the manufacture of sporting ammunition.

Mr. Bass joined Nobel's Explosives Co. in the spring of 1907 after service in the Royal Gunpowder Factory. In 1907, when Nobel's Explosives Co. transferred their Ammunition Department from Ardeer to Waltham Abbey, Mr. Bass took charge of the Ballistic Department and in 1912 became responsible for all cartridge loading. Later it was decided to centralise manufacture

of shotgun ammunition at Witton and Mr. Bass became responsible for the loading depot for London trade, first at Waltham Abbey and then from 1939 to 1947 at Angel Road (part of the old factory of Eley Bros.), where he also looked after the Shot Factory. In 1947 the depot was transferred to Brimsdown and later the acquisition of the Bisley Works, Kensworth, increased his responsibilities.

Mr. Bass, or "C.B." as he was known to so many of his old colleagues, combined business with pleasure in that his chief hobby since boyhood was shooting. He was very well known, not only to customers in the ammunition trade but also to shooting men all over the country. He first took an interest in clay pigeon shooting in 1912 and through this sport was able to demonstrate the quality of Nobel powders. Between the two wars he did much pioneer work for clay pigeon shooting and was largely responsible for arranging the first competition between England, Scotland, Ireland and Wales. This later became the outstanding clay pigeon shooting event of the year.

"C.B." also did invaluable work in the early days of Skeet shooting (clay pigeon shooting under sporting conditions), and, although often deprived from taking part in major competitions owing to executive duties, he was a member of the English International team on several occasions and also won many individual competitions. He was responsible for the formation of the Waltham Abbey Gun Club in the spring of 1914 and acted as its secretary for twenty-five years.

His host of friends in I.C.I. will wish Mr. Bass many years of happy retirement and much good shooting yet to come.

Copper Tube for the "Queen Elizabeth"

The large tube section at the Broughton Works recently delivered at very short notice a large copper tube for use in one of the boilers of the R.M.S. *Queen Elizabeth*. An urgent request was received on 13th December for a copper tube, 7 ft. 6 in. long and 17 in. in diameter, to be ready at Southampton when the great ship docked in ten days' time. Six days later the tube was finished and despatched, well ahead of schedule.

Although Broughton had previously made tubes of even larger diameter, this is the largest tube they have yet made with so thin a wall, and in completing it in so short a time they have broken all previous records.

R.M.S. "Aquitania"

All those connected with the production of 'Alumbro' aluminium-brass condenser tubes in the Metals Division may well be proud of those which were installed over twenty years ago in the famous 45,000-ton liner R.M.S. *Aquitania*. These have never had to be replaced, and are some of the first ever produced by the Company. The great ship, recently withdrawn from active service, carried nearly 1,200,000 passengers and steamed 3,000,000 miles during her career.

Insulators for Pakistan

The largest single shipment of insulators ever to be despatched by Steatite and Porcelain Products Ltd., a subsidiary company of I.C.I., was recently sent to the Pakistan Government for use in the new hydro-electric installations which are being established there. The shipment was of nearly 2000 porcelain insulators weighing in all 116 tons, and in bulk was large enough to fill thirty standard railway trucks.

Champion Bantams

Mr. Gordon Edwards, of the Sheet Mill of Waunarlwydd, distinguished himself in the National Poultry Show at Olympia last December by winning in the bantam class first prize for Wheatons and Spangles and second prize for Black Reds. The show, which was open to exhibitors anywhere in the United Kingdom, attracted in all 4277 entries.

Mr. Edwards started breeding bantams soon after the 1914–18 war, and had his first exhibition success in 1924, when he won first prize and challenge cup at the local Grovesend show. Since then he has won further prizes at shows held in South Wales, in Devon and in Cornwall.

Mr. John Martin

Mr. John Martin of Allen Everitt Works has been appointed a Serving Brother of the Order of St. John of Jerusalem, an honour reserved for those who have given outstanding service in the St. John Ambulance Brigade. Last year Mr. Martin coached sixteen students for the first aid examination in February, all of whom came through successfully.

Octogenarian Pensioners

There were no fewer than sixteen pensioners over 80 years of age and three over 85 at a pensioners' dinner held at Witton on 7th January. Over 400 pensioners, of whom 131 were ladies, attended. They were all former employees of the Witton, Amal, Plume Street and King's Norton factories.

NOBEL DIVISION

Mr. Alex Howie's Award

Mr. Alex Howie, a foreman in the Blasting Department at Ardeer, was awarded the B.E.M. (Civil Division) in the New Year's Honours List. Mr. Howie, who has had almost thirty years' service with the Company, started work at Ardeer in 1920. At the end of the war he was a member of the Ardeer team which was sent to study blasting explosives manufacture in the United States and Canada.

Mr. Alex Howie

Donations to Charities

More than £5225 was collected by employees of Ardeer Factory during the past year for donations to charities, among them St. Dunstan's Hospital, Edinburgh, the Scottish branch of the Red Cross, the Salvation Army and the Thistle Foundation. During the same period Westquarter Factory subscribed a total of £202 for charities, most of which has been shared between St. Dunstan's and the Y.M.C.A. The collection was undertaken at the suggestion of the works council.

Miss Netta Neil

Miniature Rifle Champion

Miss Netta Neil, of Dumfries Factory Laboratory, distinguished herself in last year's shooting season by winning the Ladies' Section Championship Cup of the Dumfries and Maxwelltown Small Bore Miniature Rifle Club with the average score of 97. In addition to her club prize, Miss Neil was second in the Open Class from among 300 competitors.

Last year she scored two possibles and several 99's while shooting for her club in the West of Scotland League and in the current season has done even better with successive scores of 100, 99 and 98.

PAINTS DIVISION

Dollar Sales

Two motor boats, a 24-foot "Everyman" cruiser and a 20-foot "Cruiserman," finished in Nobles and Hoare 'Albagloss' White Enamel, a product of Paints Division, recently drew great attention at New York's National Motor Boat Show. The *Wall Street Journal* says that they have outsold American boats "as much as five to one."

Singing Honour for Miss Phyllis Webb

Miss Phyllis Webb, of the Cardiff factory of Paints Division, has been chosen to sing in the Festival of Britain Choir at the 1951 Exhibition. Miss Webb, who is *Magazine* sub-correspondent for her factory, is a member of her local choral society at Maesycwmmer and of the Ystrad Mynach Section of the National Eisteddfod of Wales Choir for 1950.

A Year Without Accident

The Glasgow factory of Paints Division completed on 25th January a whole year without a single lost-time accident. More than 223,000 man-hours were worked.

I.C. (PHARMACEUTICALS) LTD.

Dr. H. Hepworth Honoured

Dr. H. Hepworth, D.Sc., managing director of I.C.(P), was awarded the O.B.E. in the New Year's Honours List. Dr. Hepworth joined Nobel's Explosives Co. in 1915. In 1928 he was transferred to the Technical Department of I.C.I. in London, and in 1934 he was appointed a director of Dyestuffs Division.

Dr. Hepworth was one of the chief exponents of the plan to extend the application of dyestuffs research and manufacture to the production of medicinal products, which has resulted in such brilliant discoveries as 'Paludrine,' the I.C.I. antimalarial specific, and 'Antrycide,' the new drug for the treatment of trypanosomiasis in cattle. He was largely responsible for the formation of I.C.(P) as an independent company in 1942, and is an original member of the board of directors.

Birth of a Drug

The sequence of events leading from preliminary research work to the bulk production of the finished drug is described in the new I.C.I. film *The Birth of a Drug*, made by the I.C.I. Film Unit. This film was given its first showing on 27th January at the British Council Film Theatre, London, and was introduced by Dr. H. Hepworth, O.B.E., managing director of I.C.(P). It will be shown to the medical profession.

PLASTICS DIVISION

Croydon Factory Closed Down

The Croydon Factory of Plastics Division ceased production on 31st December owing to the expiry of the Company's lease of the premises. Most of the members of the factory have been transferred to the new P.F. (phenol formaldehyde) Moulding Powders plant at Wilton. The Croydon plant was built in 1924 for the manufacture of ebonite dust and the moulding of ebonite battery boxes. It belonged originally to Croydon Mouldrite Ltd. and was acquired by I.C.I. in 1936.

SALT DIVISION

Pensioners and the "Magazine"

Among many letters received at Salt Division from pensioners expressing their appreciation of and thanks for the *Magazine*, which is now being distributed free to pensioners throughout the Company, comes one from a real old-timer, Mr. W. A. E. Hughes:

"Thanks for Magazine and Grains of Salt, which I find very interesting reading, and it brings back to me memories of old times. Being now in my 87 years I appreciate the kindness. Again thanking you."

Retirement of Mr. Robert Bennet

With the retirement of Mr. Robert Bennet on 31st December, the Salt Division has lost one of its chief personalities and the Mid-Cheshire salt industry one of its leading figures. During his 31 years' service with the Company Mr. Bennet, who was the Salt Division's Chief Engineer, played a prominent part in the industry, and his influence is to be clearly traced in its progress.

Mr. Bennet was born in Glasgow in 1884 and educated there. As a young man he acquired a wide background of practical technical experience with a number of Glasgow engineering firms before joining the Salt Union in 1918 as manager of the Engineering Department and Assistant Engineer to Mr. G. W. Malcolm, who was also the firm's managing director.

When in 1928 the Adelaide rock salt mine at Northwich was flooded, it was decided to reopen as quickly as possible the Meadow Bank mine at Winsford which had been out of service for many years. Within the short space of three weeks, thanks

Mr. Robert Bennet

largely to the promptness and energy of Mr. Bennet, rock salt, ready for shipment, was being brought to the surface.

When the Salt Union was taken over by I.C.I. Mr. Bennet became the first Chief Engineer of the Salt Division, and shortly afterwards he was appointed to the Division board. His crowning achievement was perhaps the designing of the new vacuum plant at the Stoke Prior Works, probably the most advanced plant of its kind in the country.

By his unfailing kindness and sympathetic understanding Mr. Bennet has won an abiding place in the affections of the many salt workers who have been associated with him during the past thirty-one years.

Passing of the "Nil Desperandum"

As reported in the B.B.C. programme "News from the North" on 19th December, the Salt Division's old steam barge *Nil Desperandum* has been finally destroyed in the Flashes—the shallows of the river Weaver.

Captain J. Atherton at the wheel of Nil Desperandum

The *Nil Desperandum* was built in 1867 at Winsford, where the building and maintaining of river craft was a thriving industry. She was first in service with the firm of George Deakin, which was taken over by the Salt Union on its formation in 1888 and during more than three-quarters of a century of service has carried many thousands of tons of salt down the Weaver to Liverpool.

During the war the *Nil Desperandum* sank in the Mersey after striking a submerged wreck, but happily was salvaged and restored to service. Her captain at this time and for the last years of her service was Mr. Joe Atherton, who has now taken a job ashore as the craft runner at the Winsford office, a post which carries with it the local title of "admiral." Mr. Ellis J. Hough, who was her engineer for more than twenty years, is now, at the age of 81, one of the Salt Division's oldest pensioners, maintaining his family connection with the Weaver through his son, George Hough, who is engineer of the *Syria*.

The *Nil Desperandum* was condemned in March 1948 and, after being stripped of her fittings, was taken on her last voyage along the Weaver to the Flashes, where she was scuttled, but part of her stern continued to show above the water, threatening the safety of the private craft using the Flashes. To remove this danger the protruding portion was finally despatched with explosives.

Mr. Ellis J. Hough, Engineer of Nil Desperandum, *with Mrs. Hough*

Raw Materials of the Chemical Industry

LIMESTONE

LIMESTONE is both one of the most important and one of the most easily obtainable of all the raw materials of the chemical industry. In many parts of the world whole ranges of hills consist largely of limestone or of chalk, which is chemically identical with it. In Britain, for example, the Mendip Hills in Somerset and the Peak District of Derbyshire consist almost wholly of solid limestone with only a thin top coating of soil. At Buxton, headquarters of I.C.I.'s Lime Division, an extremely pure form of limestone occurs, containing only 2% of impurity, and over 2½ million tons are quarried every year. The Company's great quarry at Tunstead, the face of which is over two miles long, is the largest of its kind in Britain. The Division has three other large quarries in the district, and another at Llysfaen in North Wales. Limestone has many uses. Most important of all, it is used in making sodium carbonate by Solvay's process. When burnt in kilns it is converted into lime, used in great quantities by the iron and steel industries, in agriculture, in making bleaching powder and other chemicals, in the papermaking and building trades, in tanning, and in many other ways.

The origin of limestone is as interesting as its uses. Much of it is of organic origin, being the skeletal remains of marine animals which flourished tens of millions of years ago. Some of these animals, particularly the Foraminifera, of which chalk almost entirely consists, are so minute that they can be clearly seen only with the help of a microscope. These micro-organisms lived in water, and when they died their skeletons sank to the bottom. In the course of tens of thousands of years this deposit—sometimes hundreds of feet thick—was thrust up above the water by some great crumpling of the earth's crust, forming the chalk hills of today. When we walk on chalk or limestone, we are treading what was once the bed of the sea.

Many other living creatures contributed to the making of limestone, and their fossilised skeletons can often be

Lime is an indispensable fertilizer, serving the double purpose of neutralising acidity in the soil and of supplying calcium, an element essential for the growth of plants

Lime saves miners' lives. Ground limestone dusted along the underground workings so effectively reduces both the risk and the spread of explosions that its use is now compulsory

recovered intact. Sea-lilies—marine animals consisting of a delicate plume of feathery tentacles at the end of a long, jointed stalk—were specially important. On the Northumbrian coast the fossilised sections of the stalks are often washed up; they are known locally as "St. Cuthbert's beads." The shells of oysters and similar shellfish and the skeletons of corals also contributed to the making of limestone.

It is, however, probable that not all limestone is directly of organic origin, for in many places no fossilised remains at all can be detected in it. Much of this sort of rock may have been formed by microbes which have the power of precipitating lime dissolved in water, for just such a change is known to be happening today in the sea off the coast of Florida. Some may result, too, from a purely chemical kind of precipitation, for limestone passes into and out of solution in natural water.

Although ranges of limestone hills, such as those of Somerset and Derbyshire, look as though they might exist for ever, they are in fact surprisingly quickly attacked by rain. The action of rain is, however, a chemical one, for limestone is practically insoluble in pure water. As they fall through the air raindrops absorb small quantities of carbon dioxide gas. Water charged with this gas dissolves limestone by converting it into a soluble salt, calcium bicarbonate. So great is this power of solution by rainwater that in limestone districts rivers rarely run on the surface but cut a passage for themselves through the solid rock. In the course of time these underground rivers cut deeper and deeper into their beds or find completely new courses, with the result that all limestone hills are riddled with complex systems of underground chambers and passages. Cheddar Gorge, for example, in the sides of which are the famous caves, was almost certainly formed by the falling in of the roof of a gigantic cavern formed in this way. At the foot of the gorge the Axe flows out of the ground as quite a large river. Other Mendip caves, such as Lamb Lair, Goatchurch, Swildon's Hole and Wookey extend for many miles underground, and their exploration is a well-organised and exciting sport. Derbyshire and Yorkshire have many caves, of which Gaping Ghyll is the most famous, and "cave-crawling," which the more serious enthusiasts like to call spelaeology, is a popular pastime there too.

Many of these caves are remarkable for their beauty, for where the calcium bicarbonate comes out of solution again the resulting carbonate often forms crystals of dazzling whiteness; sometimes, however, delicate colours, usually of reddish hue, are formed owing to the presence of metals, especially iron. When the carbonate is formed from water dripping constantly from the same spot the deposit grows downward as a spike—a stalactite—hanging from the roof. When the drops splash on the floor a column—a stalagmite—grows upward and may finally meet the pendant from the roof and form a solid pillar. When lime-charged water trickles over the face of a rock the latter may gradually become glazed with a continuous crystal film. Such processes are, however, very slow, and visible results represent centuries of such activity.

Such caves are of considerable scientific interest. To the archaeologist they are of interest because many of

Slaked lime absorbs chlorine to form chloride of lime—a well-known bleach and a cheap but powerful disinfectant

them were once the homes of animals and of primitive man, and traces of their former occupants are often found. Geologists, too, find them of value both because they sometimes give them access to rocks which cannot otherwise be reached and because they provide a great deal of information about the course of underground rivers. This last point is of the greatest practical importance in relation to water supplies, because in limestone districts there is relatively little surface water.

The most important user of limestone from the I.C.I. quarries is the Alkali Division, which requires over a million tons for the manufacture of sodium carbonate by the Solvay process. It was indeed because pure limestone was essential for this process that Brunner, Mond & Co. Ltd., the parent company of the Alkali Division, originally acquired an interest in the Buxton Lime Firms Co. Ltd. in 1918. After the formation of I.C.I. in 1926 this firm became I.C.I. (Lime) Ltd.

The iron and steel industry is one of Lime Division's most important customers

It was known as far back as Roman times that certain impure forms of limestone yielded, on heating and powdering, a material which set hard when mixed with water. While considerable use was made of these so-called "hydraulic limestones" they were not seriously studied until the middle of the eighteenth century, when John Smeaton was engaged in rebuilding the second Eddystone lighthouse, destroyed by fire in 1755. As the original stone-built lighthouse had been swept away in a great storm in 1703, all those in it at the time losing their lives, Smeaton was naturally anxious to give the new building the greatest possible strength. He investigated carefully a number of hydraulic limestones and finally selected one which came from Aberthaw. His example was followed by others, and it was discovered that certain stony nodules found in clay, and known as septaria, yielded an excellent hydraulic cement when burnt. In 1827 these discoveries were followed by one of much greater significance. In that year an English bricklayer named Aspdin produced the first Portland cement by burning a mixture of chalk and clay. Today Portland cements of various kinds are of immense practical importance because they are basic ingredients of concrete.

An important product of limestone is lime, which is made by roasting limestone in kilns. Small kilns built from brick or stone are familiar features of the countryside in limestone areas, but for modern industrial production very much larger kilns are used.

At Buxton about 600,000 tons of lime are made every year. The first product of calcination is quicklime. If this is treated with water it is converted, with the evolution of a lot of heat, into hydrated lime, a more easily managed form, which I.C.I. markets under the well-known trade name 'Limbux.'

Hydrated lime has many uses. Thus it will absorb chlorine to form chloride of lime, which is widely used for bleaching purposes. Chlorine from electrolytic cells in General Chemicals Division factories, for example, is converted into bleaching powder.

Lime is perhaps the most valuable of all agricultural fertilizers, serving the double purpose of neutralising acidity in the soil and of supplying calcium, an element essential for the growth of plants. Tens of thousands of tons of lime are spread on the fields of Britain every year.

The paper industry uses large quantities of lime, especially for strawboard, in making which lime is a cheap alternative to soda. In the paper industry, as in others, lime is also used for converting ordinary soda residues back into caustic soda.

Lime is also used by tanners in one of the first steps in converting raw hides into leather. The hides are steeped in a mixture of lime and water in order to loosen the hairs so that they can be easily detached.

The iron and steel industry is one of Lime Division's most important customers. To produce a ton of iron about half a ton of limestone is needed to form the slag. In the "basic" Bessemer process for making iron into steel lime is used to remove sulphur, phosphorus, and other impurities. The open hearth process of steelmaking also requires lime.

Although a substantial part of the products of Lime Division is sold outside the Company, it also supplies large quantities of raw material to other Divisions. The supply of limestone to Alkali Division for soda manufacture and the supply of lime to General Chemicals for making bleaching powder has already been referred to. In addition lime is supplied to Dyestuffs Division for making ethylene oxide, and to General Chemicals for making calcium carbide and 'Methoxone.' Hydrated lime is supplied to Nobel Division for making pentaerythritol, used in the manufacture of explosives and also as an intermediary in organic syntheses. On the other side of the ledger, the Division purchases large quantities of gunpowder, high explosives, detonators, and fuses from Nobel Division for its quarrying operations. From General Chemicals a derivation of 'Methoxone' is purchased for conversion to 'Agroxone' by the Lime Division.

"Rain before Seven . . ."

By D. A. Phillips (Central Publicity Department)

RUSKIN was right when he wrote: "There is no such thing as bad weather; there are only different kinds of good weather." Too frequently people grumble at a wet day or revel in a heat-wave, forgetting that rain may be needed for the crops or that day after day of sunshine means parched pastures or a water shortage in the city. Fog is almost the only condition of which nothing good can be said.

Country people are naturally much more weather-wise than townsfolk. Richard Jefferies, himself a farmer's son who became perhaps the greatest writer of all time about nature and the countryside, observed that it is always possible to tell the difference between a countryman and a townsman because the countryman invariably glances up at the sky when first he goes out of doors—an instinctive conning of the day.

To the countryman the weather means so much: his livelihood hangs upon its moods, and from childhood he acquires a knowledge of it that becomes almost second nature, so that a glance at the dawn sky, or the colour of a sunset, can tell him as surely as any barometer whether it is wise to cut his hay or if there will be a frost to blacken the potatoes. He has the advantage, of course, of being able to observe those natural signs which tell of impending changes—the behaviour of animals and birds, the appearance of the clouds, even the scent of flowers, are all clues to guide him.

Some of these signs may be familiar to townspeople; for instance, when swallows skim low over fields or water it is a hint of rain; but when they fly high, hawking insects above the tree-tops, fair weather may be expected. But only a countryman is likely to know that, sensing a wet or stormy night, rabbits often come out to feed in the afternoon; or that, before rain, cattle feed fast, never pausing to lie down and chew the cud as they will in settled weather. Flies are always more troublesome before rain or in unsettled weather, and midges seem very vicious. Bees are supposed to be able to foretell

the weather, and it is a fact that in showery, unsettled conditions they seldom go far from the hive. The laughing cry of the green woodpecker is supposed to indicate rain, but is probably not so reliable as some other signs, such as the twinge of a corn or an old wound.

But it is to the sky that the weather-wise countryman looks for guidance on future conditions, and from a study of clouds and the wind a wonderfully accurate short-range forecast can be given. Generally speaking, in this country winds from the east and north are dry, although they are often associated with much cloud and dull weather; those that bring rain or unsettled conditions come from the west or south. Such winds are generally warm and moist, while those from the north and east are cooler, having been chilled in their passage across vast cold regions of the northern hemisphere. North and east winds, too, are frequently associated with a "high" glass, indicating what is technically known as an anti-cyclone. "First rise after low, expect a blow"—referring to a sudden jump in the glass—is very true.

Those high, wispy clouds in a blue sky, sometimes known as mares' tails, often foretell high winds or a change of wind direction, and a greenish tinge in the sunset sky is a sure indication of winds or gales to come. A sky that darkens towards evening to an overall grey with darker wisps and patches passing below means rain; but high, white "cotton wool" clouds (called cumulus) often occur in settled fine weather and do not necessarily bring rain. Thunder clouds, normally accompanied by hot, close conditions at ground level, can be recognised by their sharp-edged outline; they usually come up against the prevailing wind, passing beneath higher clouds moving in a different direction.

In summer a heavy dew foretells a fine day, and the appearance on an early autumn morning of a myriad cobwebs, each bejewelled by dewdrops, is a certain sign of good weather. "Mist in the hollow, fine weather to follow" is also seldom wrong. On the other hand, a succession of three white frosts is frequently followed by a change; and the saying, well known in some country districts, "Fogs in February, frosts in May" usually proves fairly accurate.

The behaviour of some flowers can be a sure guide to future weather. Best-known example is the tiny scarlet pimpernel, which never opens its petals except in settled, sunny weather; while the perfume of some garden flowers—especially in the evening—is always more noticeable before rain or in unsettled weather. Similarly the farmer knows that the scent of his hay, his pig-styes —and his "muck heap"—will warn him of coming rain. And have you noticed how a clothes line becomes taut before rain?

It is a common belief that the phases of the moon and the state of the tides influence the weather. Certainly a wet day at the seaside often clears at the turn of the tide. Conversely, in places where large areas of sand are exposed at low tide, as on the west coast of Wales, showers often occur even in settled weather, and have given rise to a local saying, "the shower before the tide." The time of day is also of importance to the weather prophet. "Rain before seven, fine by eleven" rarely proves false, and many people regard three o'clock in the

"Mist in the hollow, fine weather to follow"

afternoon as a great "clearing up" time, while a brilliant dawn often means that it is "too fine to last."

When a countryman sees the smoke from his chimney blowing down he expects rain—and many people will have noticed the strong smell of soot before rain—but when the smoke spirals up he looks with confidence for settled weather. Fires burn brighter in frosty weather, and a stagnant fire is often evidence of a low glass.

Some beliefs about the weather have little foundation in fact. For instance, it is commonly said that an abundant crop of berries or wild fruits foretells a hard winter—the prolific harvest being Nature's thoughtful provision for birds and animals in severe weather. In fact, a goodly harvest of wild fruits means simply that the past spring and summer were favourable to the formation of fruit or berries.

The science of meteorology has advanced enormously with the development of air travel. Many new devices are in use to aid the "met" people in making their forecasts, such as the reporting apparatus known as radio sonde, which gives a "running commentary" by wireless as it travels up to a height of fifty thousand feet (ten miles) through any kind of weather. It sends back reports of pressure, temperature and humidity at every thousand feet.

Again, there are the weather ships now operating in the Atlantic, named respectively *Weather Observer*, *Weather Recorder*, *Weather Explorer* and *Weather Watcher*. All are ex-naval corvettes, adapted and specially fitted with instruments for recording and observing conditions at their stations far from land. Their officers are able to radio the very latest information to the "met" officials on shore, who thus have an authentic and up-to-the-minute record of the weather over a vast area, to supplement the information obtained from widely scattered land stations.

The meteorologist relies on simple rubber balloons to provide him with a lot of his information. These balloons are of three types. Small balloons are employed to discover the height of cloud layers. These balloons rise at approximately constant speeds (200, 300, 400 feet per minute), and the time they take to disappear into the cloud layer is measured by means of a stopwatch. Large balloons, ninety to a hundred and fifty inches in diameter, are used to determine the upper winds from theodolite observations. These rise at an approximately constant rate (four hundred to five hundred feet per minute), and adjustments can be made to give any rate of rise within a given range. Finally, there are the very large balloons used to carry radio sonde.

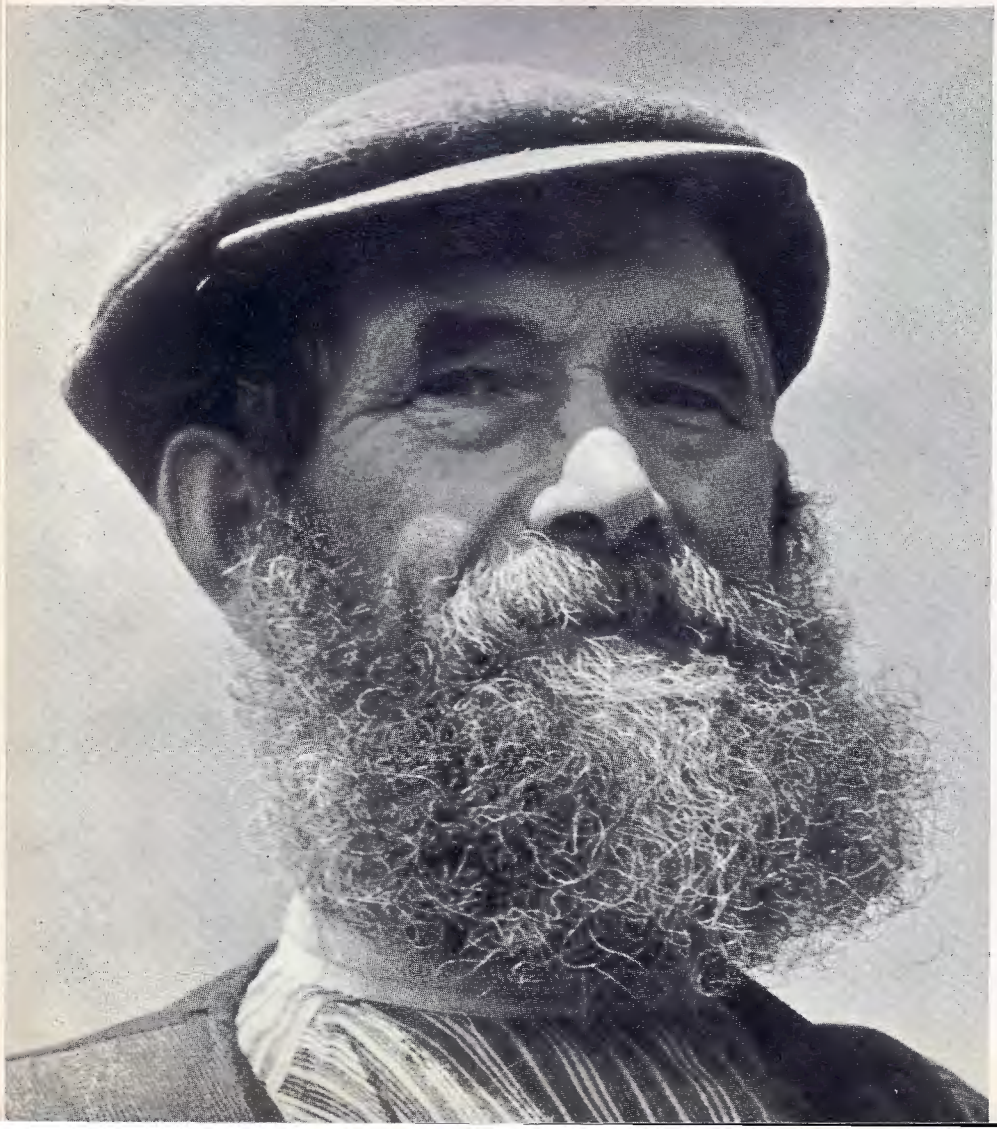
Colour as well as size enters into the use of balloons for "met" work. White is easily seen against a grey, leaden sky, while red is used for a blue, cloudless sky, or for a blue sky with high clouds. Some of the colours and the special rubber latex chemicals used in the manufacture of these balloons are made by I.C.I.'s Dyestuffs Division, and the Rubber Service Department at Blackley has studied the various methods of making the balloons.

Quite recently, too, Billingham Division was closely associated with experiments aimed at causing rain by chemical means. By dropping quantities of 'Drikold'—solid carbon dioxide—from an aircraft into cloud formations a shower of rain was produced.

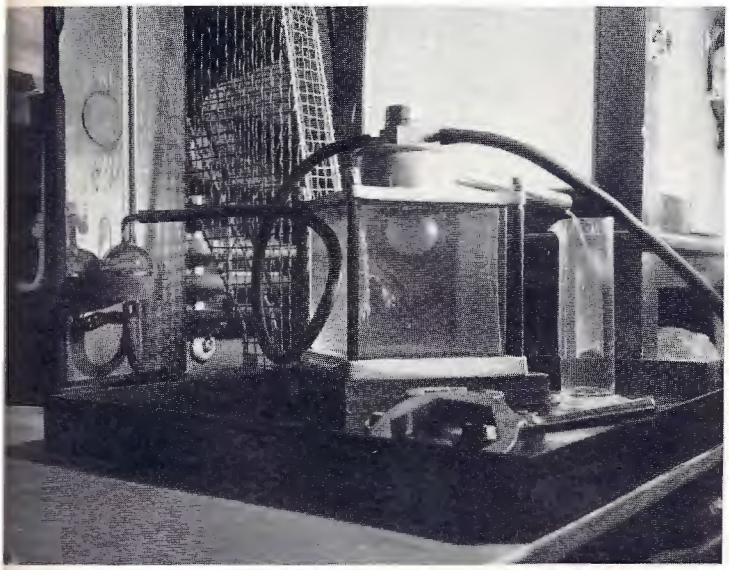
During the war, when there was a security ban on reports and forecasts of the weather, many of us missed the homely announcement from the wireless, "Here is the weather forecast," as well as those intriguing maps and diagrams that graced the columns of the more sedate newspapers. The influence of the weather upon the day-to-day operations of modern warfare, as well as upon long-range planning, is so great that it was important to deny the enemy as much meteorological information as we could.

Today the work of the weather experts is scarcely less important, for the many changes in our variable climate exercise great influence on both agriculture and industry, and in fact affect almost everybody. Yet while the meteorologist, surrounded by every scientific aid, reads his instruments, consults his maps and charts, and listens to reports of weather conditions far out in the Atlantic, it is perhaps more satisfying—and some will say more accurate—to do as the shepherd or farmer, who goes to his own doorway to glance up at the sky, to feel the wind on his cheek, and to sniff the evening air.

. . . a glance at the sky and a sniff at the air . . .

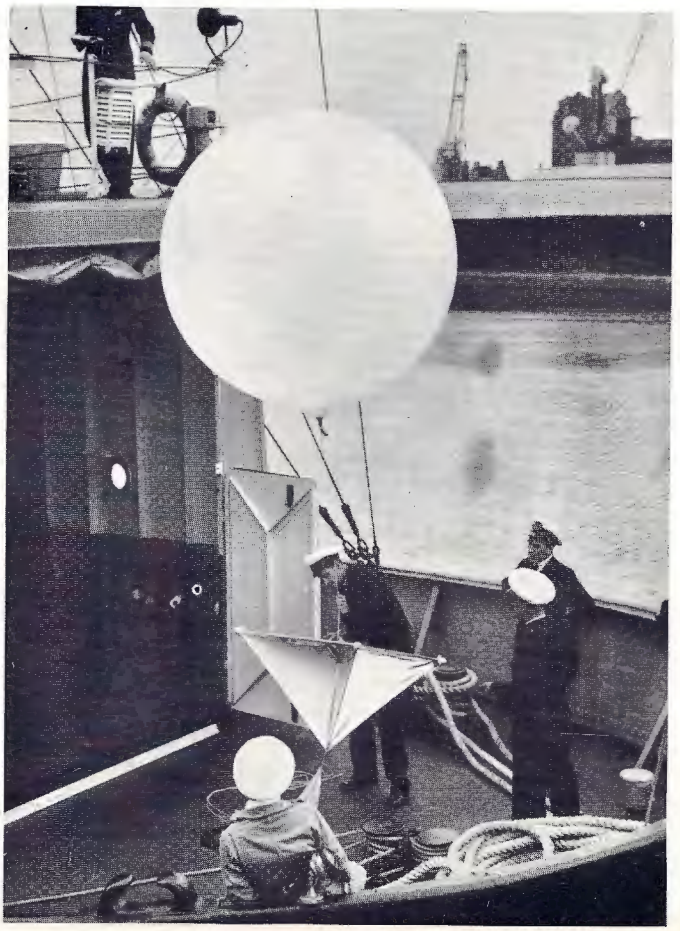


The Weather Observer, *first of Britain's new meteorological ships for the purpose of obtaining accurate weather information in mid-Atlantic*



Latex film for balloons of various types undergoes—among others—bursting tests which measure the strength and elasticity of the film. This appliance, in the Dyestuffs Division Rubber Service Department at Blackley, shows a test piece being inflated. Pressure at bursting point is measured by the mercury column in the left in the same way as a thermometer records heat, while elastic limit is shown by displacement of water from vessel to beaker

A meteorological balloon being placed in position on board one of the weather ships



QUIET WEEKEND

—*a memory of summer*

(Written and illustrated by Sidney Rogerson)

THERE ARE THOSE who decry the English weekend as an unjustifiably long interruption of the working week. Nothing of the sort. The truth is that the English malaise of "Monday-morning feeling" derives not from any aversion to hard work, but from exhaustion from the rigours of the weekend. August, for example, is a nice, end-of-summer, relaxed holiday month. Just the month for a quiet weekend in the country, especially when it is one's small daughter's birthday. Repairing home on Friday, suitably burdened with gifts for the occasion, one emerges sooty and sweaty from one of the old Great Eastern trains, now camouflaged under more grime and less paint as British Railways (Eastern Branch). The first news that greets one is that the family hound, a matron of three families and five summers, has answered, the night previously, the serenade of an unknown suitor and attempted to commit suicide by jumping from a bedroom window on to the gravel below. No bones broken, luckily, but she cannot move and is in pain.

Friday night is occupied in making plans and allotting duties for the birthday tomorrow. It is reported that the car has to be fetched from Bury (twelve miles distant), which means that one is needed to go too to drive it back, also to pick up ices and cake for the party. One agrees to do this, though one is told, first, that the pig food has run out and that the mill is shut for a week; secondly, that the vet is coming in the morning to examine the injured hound; and thirdly, that the cat needs deworming. Suddenly one remembers also that (*a*) one has asked friends to look in about 11 o'clock on their way to London from holiday and (*b*) made enquiries for a local bee expert to come in and see whether the honey harvest is ripe for taking. Still, one goes to sleep under a thin sheet with the prospect of a quiet weekend ahead.

Saturday dawns sultry with heat. Immediately after breakfast one helps to feed and water the pigs, turkeys and poultry. Then a sharp visit to the neighbouring village to see the bee man: "You fetch me here at 2 p.m. and I can manage to tend your bees. The only time I've got." Back to the mill, but it is still firmly shut, so off to a friend at a near-by farm to borrow a sack of barley. For half an hour there is a period of peace, the only one we are to know for the next twenty-four hours of daylight.

At 10.30 wife leaves for Bury St. Edmunds to do the shopping. At 11 precisely friends arrive. One offers them a cup of coffee and a bun, only to be told there is no coffee, only cocoa. They accept this winter drink on a torrid day just as the vet arrives and the telephone rings (*News of the World* asking for details of I.C.I.'s rain-making experiments with the R.A.F. on Tees-side). For the next half-hour one dodges between the telephone, visitors and vet, trying to answer leading questions, show visitors the garden and livestock and find out what is wrong with the hound.

At 11.45 the vet leaves, pronouncing the dog to be merely shaken and badly bruised. Leaves two worm capsules for cat, though suggests he would rather we administer them than he. Visitors, seeing how matters are, considerately leave also. One promptly begs a lift from them into Bury, arriving there just before the garage closes. Collect wife, car and parcels and drive home, making a detour to pick up the Sunday joint at the butcher's.

The midday meal over, one departs at once to fetch the bee man and, suitably protected by bee bonnet and veil, though otherwise only by a thin shirt, is present when the first hive is opened at 2.30. This bee expert scorns usual impedimenta such as veils or even the normal smoker. Instead rolls and lights one "shag fag" after another and, with his face pressed close to the sections, puffs smoke from the cigarette to keep the bees below, explaining that he must use shag as ordinary cigarettes are "no use at all, don't even make the bees sneeze!"

To one's dismay he decides that now he has come he may just as well take the honey (Oh Lord, that is at least an afternoon's job!). Nor does he work quickly, though most thoroughly, taking out each section and brushing the bees off with a turkey feather. One then takes the sections from him, drops them into crates, carrying each crate as it is full to the wheelbarrow which, in charge of one's naval son, is stationed at a discreet distance from the scene of operations. The Royal Navy, incidentally, is elegantly attired only in a pork-pie hat, white shorts, and shoes.

There are six hives to be robbed, and by 4 o'clock, when the guests for the tea-party are seen to be assembling on the lawn, one's shirt is wringing wet and there is still one hive left. The bees, now thoroughly disturbed, are flying everywhere, and the Royal Navy gets a sting on the forehead which causes a quicker retreat than was ever made by the *Amethyst* down the Yangtse. Unperturbed, the expert continues until at about 4.30 the job is at last over, and one is able to take off the stifling veil and get a breath of air.

With great speed one changes into respectable and dry garments, runs the bee expert back to his village and returns in time to take a seat at the birthday tea-party, opposite a young lady of two who consumes an entire plate of paste sandwiches and calls for more. The birthday cake having been cut and half the ices eaten, one's presence is required to start and umpire treasure hunts, scavenger hunts and what-have-you. This over, and while the guests are still present, there is the job of feeding and watering pigs and turkeys again and thereafter of entertaining to some form of liquid refreshment the various parents who come to fetch their offspring.

By 7.30 the policies, as the Scots say, are empty and one can sit down to the evening meal, followed by parlour games of "Up Jenkins" and "Simon Says" until the young are finally despatched to bed at 9.30.

Thereafter discussion about deworming cat is renewed. Wife indignant that vet should doubt her ability to perform the deed. Nevertheless plans are laid to seize the animal unawares and enfold its legs in a bath towel to avoid being clawed. Day ends with injured hound (weight ½ cwt.) being carried into garden to perform natural duties, and carried back. Final visit to fill turkey's food troughs 11 p.m. ends the day.

With the kitchen stacked high with crates of honey sections, Sunday as a day of rest is out from reveille. Immediately after breakfast one repairs with naval son to wash-house, where mother-in-law has considerately laid out all the necessary equipment for honey extraction. Reason for other helper being missing is explained by seeing, through window, wife stalking cat. One quick snatch results in cat swallowing pill before it knows what has happened. Fully vindicated, wife enters with smile of triumph, and honey extraction begins. With door and window closed against swirling cloud of bees and wasps who have smelt honey, room is like a Turkish bath and troops engaged progressively strip for action until scene resembles Windmill Theatre, or a sugar-beet factory at peak production.

Halt called for midday meal, when effect of drought on vegetables is mentioned. Nothing in garden but red cabbage. One foolishly volunteers to braise a red cabbage a la Flamande for supper. Afternoon nap disturbed by noise of small fry, abetted by "naval person," disporting themselves in what in normal times is a small lake but is now converted by drought into little better than mud wallow. Nevertheless hands return to task of extraction, which ends with all nearly nude and wholly overheated about 7.30. (200 lb. honey safe in cans, everyone exhausted, and house full of bees!)

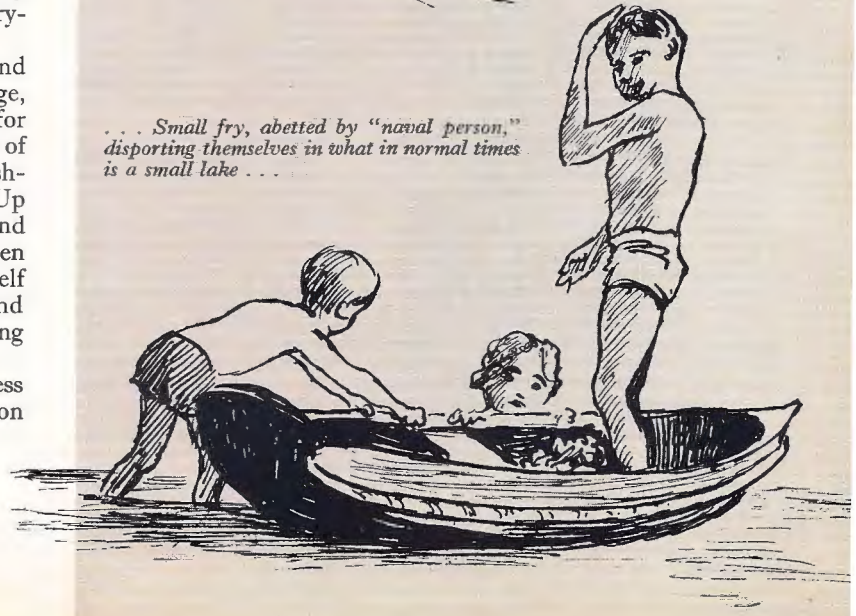
Meanwhile, about 6 p.m., one has had to feed and water animals and set to work to prepare red cabbage, assisted by youngest son, aged nine. Dish is ready for consumption by 8. After a frugal meal, the ritual of Saturday night is re-enacted (with the addition of washing-up, in which the entire troupe take part), "Up Jenkins," the ceremonial carrying out of the hound and the final look at the turkeys. Bed at 11, and even then one's rest is disturbed (*a*) by the cabbage repeating itself and (*b*) by queer sounds which turn out to be hound giving evidence of returning strength by crawling ponderously upstairs.

No wonder that it is with much yawning and weariness that one catches the early train from Stowmarket on Monday after a quiet weekend.

. . . ordinary cigarettes are "no use at all, don't even make the bees sneeze!"

. . . elegantly attired only in pork-pie hat, white shorts, and shoes

. . . a young lady of two who consumes an entire plate of paste sandwiches and calls for more. . . .



. . . Small fry, abetted by "naval person," disporting themselves in what in normal times is a small lake . . .

OIL CRACKING AT WILTON

At a meeting of the Plastics Division Council in the autumn of 1949 Dr. J. W. Armit, chairman of the Wilton Council, gave an address on the inception, the purpose and the organisation of Wilton, the great new I.C.I. undertaking on Tees-side. Of particular interest were Dr. Armit's references to the Wilton oil-cracking plant, about which he had the following to say.

In America over the last twenty years oil cracking has been employed not only to increase the quantity and improve the quality of petrol, but also for the sake of the unsaturated hydrocarbons* produced, from which a huge trade has been built up in heavy organic chemicals—solvents, plasticisers, organic acids, and the great wartime development of synthetic rubber. The leading firm in the heavy organic field is the Carbide and Carbon Chemicals Corporation, and it has been followed closely by the oil companies—the Shell Company being the first of them in the field.

I.C.I. long studied this branch of industry, and at different times propositions were put forward by technical and by development departments based either on utilising cracking gases available at oil refineries—e.g. those of the Anglo-Iranian at Grangemouth or Llandarcy—or on cracking oil in our own factories for maximum unsaturated gas yield. For one reason or another these schemes fell through.

When Billingham began to produce oil from coal and from creosote by hydrogenation a new chapter in the study of oils opened in this country. An immense body of knowledge on the behaviour of hydrocarbons was accumulated and actively studied. Hydrogenation under manufacturing conditions involves cracking—the two processes are complementary.

The need in the war for very high grade petrol for aircraft led to the building and operation for the Air Ministry of an aviation petrol plant by the joint efforts of our Company, the Shell Oil Company and Trinidad Leasehold Limited. Our association with the oil companies was close. A scheme was advanced for one of the oil companies and I.C.I. jointly cracking oil and manufacturing heavy organic chemicals from the gases produced. I.C.I. had the chemical knowledge and the markets and the oil company had the oil and the practical knowledge of its handling on a very large scale.

The site for the scheme was to be Wilton, but like the earlier projects it did not come to fruition. I.C.I., however, being convinced that the aliphatic chemicals field was of immense importance for the future of the organic chemical industry in this country, decided to go ahead with the project on its own. Contracts were placed for cracking plant with the Kellogg Company of America, and towards the end of 1950 the cracker, gas separation plant and the ethylene and propylene using plants should be completed.

Briefly, the scheme is that some 200,000 tons a year of oil will be delivered by ocean tanker to an oil wharf at Teesport and thence pumped to storage tanks on the Wilton site. It will be cracked by the most modern technique. In the cracking process around half of the oil is converted into gases, the greater part of which are chemically very reactive, and the other half of the oil gains some important qualities which improve it for use as a component of petrol. This petrol fraction after refining will be pumped to Billingham.

From the gases four fractions are separated—a hydrogen, ethane, methane fraction; an ethylene fraction; a propylene fraction; and a butylene plus butanes fraction. The ethylene will be used at Wilton in the production of polythene by the Alkali Division, and the foundations and steelwork of this plant are well advanced. The ethylene will also be used to produce ethylene oxide and glycol in a plant being designed by the Billingham Division which will be situated adjacent to the polythene plant. From the ethylene oxide 'Lissapol' N will be made by the Dyestuffs Division in a plant alongside the ethylene oxide plant. The hydrogen, methane, ethane, and the propylene fractions will be sent by pipe-line to Billingham. The former will be completely converted in plant that was part of the original coal hydrogenation installation into hydrogen for use in the Billingham ammonia and petrol plants. The propylene will be converted into isopropyl alcohol in one of the high-pressure converters available at Billingham. There will be a sale for some of this in the refined stage, but the greater part will be oxidised for acetone in a new plant now reaching completion at Billingham and a main outlet for it will lie in the manufacture of methyl methacrylate for 'Perspex.'

The butylenes and butanes will in the first instance be blended with petrol at Billingham or bottled for sale. Later, chemical outlets will be developed.

The petrol fraction and the three gaseous fractions just mentioned will be pumped to Billingham via what is known as the Link: this is a 50 ft. wide pipeway on the north and south banks of the Tees, connected by a 9 ft. diameter tunnel under the river.

**Unsaturated hydrocarbons. Hydrocarbons which are highly reactive because they do not possess their full complement of hydrogen atoms.*

MICROFILMING

By Dr. J. E. Holmstrom

The story was current after the first world war of a general who, on taking command of a division in the field, found its headquarters cluttered with files of old papers which he could see no possible object in keeping. He wrote accordingly to his corps headquarters, asking authority to destroy those no longer needed. After a proper interval the answer came back: Yes, obsolete records might be destroyed, but as a precaution a copy must first be taken of any such.

Probably this is apocryphal, but the point of repeating it here is that if the copying were done with a microcamera such a requirement might not be absurd at all. Confronted with a mass of records which may conceivably include some items that may be needed again, the cheapest, quickest and simplest solution may be to reduce their bulk by 99% by microfilming the whole lot rather than to attempt to wade through them to decide which items really need be kept.

Microcameras are of two types. The more flexible in application is made to take either 35 mm. (standard cinema) or 16 mm. (substandard) film spools and operates pointing downward over a suitable illuminated table on which are laid the loose sheets or the opened books or journals or newspapers to be photographed. As fast as the operator can turn the pages he depresses a pedal which causes the camera to make one exposure and to advance the film automatically in readiness for the next.

The other type, known as the Commercial Recordak, takes 16 mm. film on which only loose documents not wider than foolscap, but of any length from an index card to a continuous band, are photographed simply by feeding them into the machine between rapidly revolving rollers. Many thousands an

hour can be done, and at the end of the day whatever length of film has been exposed can be cut off inside the camera without need for a darkroom and sent by messenger to the makers, who will develop it overnight and return it next morning.

Developed microfilm can be read in a "micro-reader" which throws an image on a screen full size or larger. Alternatively, it can be projected on to the wall for several people to read at once or be examined in a pocket-size monocular viewer which, though tiresome to use for long, is convenient for reading an occasional "frame." The earlier apparatus caused eyestrain and irritation, but recent improvements leave little to complain of in this respect.

There is also a trend away from keeping the film in continuous spools—a system abandoned many centuries ago in the case of paper documents—in favour of short strips or single frames, which are more convenient when cross-referring from the image of one page of a microfilmed book to that of another page not consecutive with it. Microfilms can also be instantaneously enlarged on to paper, almost indistinguishable from the originals, but the necessity for drying the prints after processing interrupts the continuity.

The cost of providing a microcamera and of replenishing and processing the films amounts to only a small fraction of a penny per exposure.

Preservation of archives is very far from being the only application. During the war, for instance, countless organisations safeguarded themselves in this way against losing important records. I.C.I. put microfilms down its rock salt mine at Winsford. (Supposing that everything else in the country had been destroyed, and these films were discovered by archaeologists some centuries hence, it is interesting to speculate how faithful a picture of contemporary Britain they could have reconstructed from these records alone!)

Everyone who served overseas during the war knows that microfilms were also used for transmitting what were called "Airgraph" letters, re-enlarged to a legible size at the receiving end. A similar method is now used by such organisations as the Royal Society of Medicine for supplying scientific workers at isolated posts overseas with the literature they require. *The Times* is obtainable in microfilm form from its first number, dated 1785. Millions of pages of German industrial reports captured after the war were microfilmed and can be read at, or copies obtained from, the Board of Trade. Banks microfilm their cheques, using special apparatus with mirrors whereby the endorsement is photographed alongside the face of each. Innumerable other administrative, commercial and scientific uses might be mentioned.

Apart from the saving in time, another great advantage over copying by a human agent is the guarantee of perfect accuracy, not only of text but of illustrations, although no checking is involved.

An interesting device for scientific literature searching is the Microfilm Rapid Selector. This machine instantly photographs any sheet of paper or page of a bound book on one half of a microfilm frame the size of a postage stamp, and has a keyboard like a typewriter whereby the nature of the subject-matter can be coded in the other half of the frame in the form of a pattern of dots, like the pattern of holes punched in a Hollerith card. These photographs are made in random order, just as the documents happen to come, saving all the tedious labour of filing the references in an ordered sequence. The film may be several miles long, containing a million items or more. When it is required to pick out those items which have been coded in any particular way the selector is set accordingly and the film run through it at a speed of 10,000 frames a second (equivalent to 100 seconds for a millions items scanned). By automatic optical and electronic means the machine then senses the passage of the required coding across its field of view and when this occurs re-photographs the image of the document so coded, without stopping the film, on to a stationary film which can either be read in a viewer or re-enlarged to full size on paper.

If we imagine this American invention coupled to another, the Ultrafax, which very rapidly transmits the facsimile of documents over a distance, we come within sight of what is perhaps to be the ultimate consummation of these developments: the possibility of a researcher being able to dial either a bibliographical reference and page number or the code number of a subject and watching the required selections from the world's literature appear before him on a television screen, the administrator and businessman doing the same thing with their files.

MAN'S QUEST FOR COLOUR: NEW DYES FOR OLD

By K. A. Lunn, Dyestuffs Division

ALL coloured articles, it should be realised, cease to be coloured in the dark: they exhibit their various colours only by virtue of the light that falls upon them, light of some colours being absorbed, of others reflected, according to the chemical properties of the colouring matters present in the substances.

Colouring matters may be divided roughly into two main groups: dyestuffs and pigments. Pigments are insoluble and are derived from many sources, some being obtained from the earth, others made as by-products from certain industrial processes, and many, like the high-quality 'Monolite' and 'Monastral' pigments of Dyestuffs Division, being complex organic compounds specially designed for exacting requirements.

In the main, pigments serve as colouring agents for paper, linoleum, concrete, etc., and in surface coatings such as paints, lacquers, printing inks and so on, although important subsidiary uses are now found in the mass pigmentation of plastics, rubber, and synthetic fibres. Every different application has its own special requirements as to light-fastness, heat resistance, opacity, fineness of division, tolerance to acids, and other properties; and in the Lakes and Pigments Section of Dyestuffs Division's Dyehouse Service Department constant study is given to the manifold needs of the pigment-using industries.

The term "dyestuff" is generally reserved for colouring matters that are soluble, either in water or some other convenient solvent, and it is, of course, in the form of solutions that dyestuffs are applied to textiles, leather, paper, plastics and other materials. Not all soluble coloured substances are dyestuffs, however. We should be disillusioned if we tried to dye, say, a length of white cotton in copper sulphate solution or in Condy's fluid (sodium permanganate solution). It just would not work.

To merit the name dyestuff a coloured substance, besides being soluble, must possess that all-important but as yet imperfectly understood property called affinity. This is the strong mutual attraction between dyestuff and fibre that enables the fibre, during dyeing, to extract the dyestuff from the solution and to hold on to it firmly even when the fibre is afterwards washed vigorously in hot or boiling soap solution. True enough, we are all familiar with colours that "run" during washing, and it is a fact that a large number of dyestuffs—unfortunately those that are easiest to apply—"bleed" to varying extents during the washing of the textiles on which they are dyed. Nevertheless, even a dyestuff of only poor affinity takes an extremely long time to wash away completely from a textile material.

The first synthetic dyestuffs to be discovered, ninety-odd years ago, were the so-called "basic" dyestuffs. The colour of copying-ink pencils is due to a basic dyestuff, methyl violet, which is mixed with the graphite from which the pencil "leads" are moulded. The basic dyestuffs were found to dye wool, silk and other animal fibres readily enough, but would only dye cotton and cellulosic fibres if the latter were first mordanted—that is, treated with certain chemicals capable of binding or fixing the dyestuffs. In other words, basic dyestuffs lack affinity for cellulose. Now, these dyestuffs, although giving intensely brilliant shades, were soon found to fade badly on exposure to light, and for many years this failing caused synthetic dyestuffs to be regarded with great suspicion.

In 1860, however, P. Griess (a brewery chemist!) discovered the important diazo reaction, whereby many organic bases

(nitrogen-containing compounds) are rendered capable of combining with phenolic compounds to form azo dyestuffs. Since that time many thousands of different azo dyestuffs have been prepared in the laboratory and some hundreds have proved to be of commercial value. The best are incorporated in Dyestuffs Division's 'Chlorazol' and 'Durazol' ranges of direct cotton dyestuffs and in the 'Lissamine' and naphthalene ranges of wool dyestuffs.

The chief virtues of these classes of dyestuffs are their brilliance of shade and great ease of application. In fastness to light they vary considerably, ranging from poor to very good. Their great drawback, however, is their indifferent fastness to washing. In many cases the latter can be improved considerably by a suitable aftertreatment, but in general it is not of a high order. That is why the packet dyes we buy in the shops, which consist of dyestuffs of these classes, are generally unsuitable for fabrics that have to be washed frequently. The really wash-fast dyestuffs—mordant dyestuffs in the case of wool, and vat and azoic dyestuffs in the case of cotton—are too difficult for people without technical training to apply successfully to fabrics and hence never make their appearance in the little packets.

Towards the end of the nineteenth century a new class of dyestuffs—the sulphur dyestuffs—made its appearance. The colours in this class proved mainly of use for dyeing cotton and were very much faster to washing than the direct cotton dyestuffs, although generally dull in shade. For the dyeing of goods such as overalls, cotton for stripings in men's suits, gaberdines and services equipment, however, they have proved extremely useful and are in wide use today.

A similar improvement in washing fastness was obtained, in the case of wool, by the development of the mordant dyestuffs. These are wool dyestuffs which are rendered insoluble on the fibre by combination with chromium sulphate, giving by this means dyeings that are very fast to washing. The mordanting process tends to dull the shades obtained, but for very many purposes this is no disadvantage. A notable advance in the wool-dyeing field was made in the late 1930's by the introduction of the 'Carbolan' dyestuffs, patented specialities of Dyestuffs Division, which combine great brilliance of shade with mordant-standard washing fastness.

To turn again to vegetable fibres, it was in the early years of the present century that vat dyestuffs began to make their appearance in important numbers, and for the first time it became possible to dye vegetable fibres to bright shades that were really wash-fast. Indigo, most famous of all vat dyestuffs, had of course been known (as a natural product) for centuries, but now synthetic indigo, and many more synthetic vat dyestuffs of all shades, became available for the use of the dyer. Somewhat paradoxically, the vat dyestuffs as sold are insoluble. The dyer makes them temporarily soluble by a chemical reduction treatment, and it is in this soluble form that they are applied to the fibre. Once applied, they are allowed to oxidise back to the insoluble pigment form, giving extremely wash-fast dyeings. For shirtings, towels, furnishing and casement fabrics, and many other materials, vat dyestuffs are now considered indispensable.

Supplementing the vat dyestuffs, especially in the production of bright red, scarlet, orange and maroon shades, in which the vat range is rather deficient, we have the azoic ('Brenthol') dyestuffs. These, too, although called dyestuffs are in reality pigments, being azo dyestuffs that are insoluble owing to their particular chemical structure. In this case it is the dyer himself who performs the final colour-making operation by uniting the necessary components on the actual fibre, and very wash-fast dyeings are produced.

Let us now turn briefly to synthetic fibres. By far the most important of these is viscose rayon, and this (very happily for the dyer) can be dyed with all classes of dyestuffs used for cotton. In the early 1920's acetate rayon—a new, lustrous, silk-like fibre—appeared, and defied nearly all attempts to dye it. Almost all existing dyestuffs proved useless, but the impasse was finally solved by two research chemists working in the laboratories of the British Dyestuffs Corporation (later Dyestuffs Division). These two chemists, J. Baddily and the late A. Shepherdson, discovered an entirely new class of colouring matters, the 'Dispersol' range of dispersed dyestuffs. These are insoluble in water but, when dispersed very finely in suspension in water, act just like soluble dyestuffs and dye the acetate rayon as if they were in fact in solution. Twenty years later, when nylon appeared, it was again the dispersed dyestuffs, alone among all the dyestuffs available, that proved satisfactory for dyeing nylon fabrics.

In the opening paragraph it was stated that coloured articles cease to be coloured in the dark. While this, strictly speaking, is quite true, there are nevertheless certain dyestuffs which are actually luminous and display their characteristic shades even in the absence of external lighting. Again, there are fluorescent dyestuffs which luminesce when invisible ultra-violet rays fall upon them. Practical advantage is taken of these in the so-called "black lighting" used in many cinemas, where carpets dyed with fluorescent dyestuffs are in this way made just luminous enough to guide patrons entering in the dark.

Dyestuffs and pigments, and their innumerable applications in industry and the arts, certainly form a truly fascinating subject of study.

I.C.I.'S WATER TREATMENT SERVICES

The treatment of natural water, to prevent and remove impurities which cause premature wear and problems of maintenance in industrial plant, is one responsibility of the Alfloc Water Treatment Service, of which some aspects are described in the following note.

WITHIN the Company, water treatment is carried out under the control of Division water chemists with guidance from the Central Water Advisory Service, operated by the Technical Service Department of the Alkali Division at Winnington. The Alfloc Water Treatment Service of the Alkali Division (which originated in the firm of 'Alfloc' Ltd.) deals with steam-raising and water-using plant in factories of all kinds, in collieries, public undertakings, steamships and railways. 'Alfloc' methods are also applied to condenser and process water cooling systems, to the water used in laundries and in bleaching and dyeing textiles. Treatment of municipal water supplies (including softening, clarification and colour removal) is another part of the 'Alfloc' service.

Most of the chemicals used in water treatment—sodium carbonate, caustic soda or sodium aluminate, and the special briquettes, liquors and powders sold under the registered trade mark 'Alfloc'—are manufactured by the Alkali Division, but the products of other Divisions are also employed; for example, chlorine from General Chemicals Division, anti-slime and anti-foam agents from Dyestuffs Division, lime from Buxton and salt from Winsford.

These chemicals are required to counteract the effects of dissolved solids and gases (mainly oxygen and carbon dioxide) and sometimes organic matter, the impurities in natural water supplies that are responsible for many operating difficulties in industry. For example, the "hardness" of water (due to the presence of calcium and magnesium salts) causes scale in boilers similar to the "fur" which forms inside a kettle; it also causes waste of soap in laundries. Dissolved oxygen and carbon dioxide are contributory causes of corrosion in steel pipe-lines, while organic matter favours the growth of algae, or slime, in condensers and cooling systems.

The main I.C.I. processes of water treatment, whereby these impurities may be removed or prevented, can be classified as softening, evaporation or distillation, de-aeration and sterilisation. There are several methods of softening, but the one more commonly recommended is the lime-soda precipitation process, involving treatment with industrial alkalis and settling the resultant sludges.

Evaporation or distillation is commonly used for providing pure make-up water to high pressure or marine boilers. However, even this mixture of condensed steam and distilled water

requires careful conditioning with small quantities of chemicals to render the boiler water free from the danger of scale and corrosion. For example, the distilled water on board ship is often made by the double distillation of sea water, yet traces of salt find their way into the boilers from this source. Salt also may contaminate the return water from the main condensers if these leak slightly.

De-aeration consists in removing all dissolved gases by mechanical or chemical means, and sterilisation treatment aims at removing bacteria and other organisms by means of such chemicals as chlorine and sodium hypochlorite.

In all these processes I.C.I. chemicals and experience—via the Alfloc Water Treatment Service—are there to help the consumer and to speed production by bringing better water to industry and the community generally.

THE COMPENSATED OPAL

INFORMATION NOTES *printed recently an article from* For Instance, *a bulletin published by the American Cyanamid Company of New York. The following note is taken from the same source.*

WHEN we enjoy the riot of colour of magazines, modern textiles and paints or plastics we are not apt to give much thought to the skill and instrumentation which developed these colours and maintains them to a given shade. Well-trained eyes are necessary for colour matching in industry, but eyes become tired and lose efficiency. When absolute colour standards are required they can be obtained with a spectrophotometer. This instrument compares any colour, including black and white, with a standard white and expresses the colour in terms of the wave length of its reflected or transmitted light. It does this in about two minutes, and produces a curve which is an absolute measure of the colour of our sample.

A uniform source of white is necessary for a standard of comparison, and this is made by "smoking" magnesium oxide on to a metal surface. When a layer of specific thickness is deposited it is almost a perfect white. However, this layer is rather fragile and is readily contaminated, so that a secondary standard is used quite often. Generally it is a piece of white opal glass, but this cannot be made as white as the magnesium oxide standard. Hence some calculations are required with each colour measurements to compensate for the difference in whiteness of the opal glass and the standard.

In our laboratories we discovered that by using the correct piece of clear glass with our colour sample we can compensate for the lack of whiteness of the secondary standard and so eliminate the time-consuming calculations. The combination of opal glass and compensating clear glass has been called the "compensated opal," but, no matter what its title, it is a very welcome time-saver.

PROPELLANTS AND HIGH EXPLOSIVES

Contributed by Nobel Division

EXPLOSIVES are used either to propel objects to a distance—as in the case of a bullet—or as a force to shatter material such as rock or coal; though in some cases, as in quarrying, a compromise is necessary. But whether used as a propellant or for blasting the explosive achieves its purpose by producing gas at very high pressure in a relatively short space of time.

If a propellant effect is required, the gas pressure and its rate of development must be adjusted to suit the strength of projectile and gun, the weight of the projectile, and the length of the barrel. The pressure must not be too high or be developed too rapidly, otherwise the weapon may be damaged or the projectile thrown inaccurately. For military demolition, on the other hand, the velocity of the explosive (the rate at which it burns) should be as great as possible. Most blasting jobs demand an intermediate performance; for example, in winning coal the ideal explosive is one which breaks the coal into large lumps and shoulders it away from the face.

The design of explosives for such widely varying purposes is made possible because decomposition can proceed through an explosive mass in two fundamentally different ways. In the first of these the explosive burns or "deflagrates," and may be used as a propellant, provided the velocity is adjusted to the required level during manufacture of the explosive mixture.

In the second process, known as detonation, the speed of burning is very much higher, and the pressures are developed abruptly and with shattering effect.

It is thus possible to design a wide range of blasting explosives, from relatively mild coal-mining explosives (such as Nobel Division's 'Rounkol') to highly explosive types like Blasting Gelatine. Similarly, different kinds of propellants for use in ammunition of various types—ranging from shotgun cartridges to military and naval projectiles—can be produced.

VISITORS' BOOK

THROUGHOUT every Division of the Company—in factories, laboratories and offices—each working day is visitors' day and finds strangers within the gates—strangers in name only, for most are members of the I.C.I. family, though with its immense range of interests the Company inevitably has a very large number of visits from representatives of other industries and from among its customers and agents at home and overseas. All these visits have a purpose—some deriving from the rich fund of knowledge stored in I.C.I., others contributing to the common pattern of the Company's progress and prosperity.

So numerous are the visits exchanged between representatives of Divisions and departments that they may sometimes be accepted as commonplace and their significance improperly appreciated. Yet such personal contacts help to forge strong links in that chain which binds the units of the Company one to another; they emphasise the importance which I.C.I. places upon co-operation—particularly in research and development—and stress the vital technical and economic interdependence of one Division upon another. Similarly, such exchanges of visits between representatives of Divisions serve as a stimulant for ideas, and may in some cases lead more quickly and easily to a solution of mutual problems, both technical and administrative.

Lord Northcliffe was accustomed to urge his editorial staffs to get out and about, to meet people and, above all, to see for themselves; what is true in running a "live" newspaper is equally true of the conduct of a business, and by seeing for themselves those in I.C.I. who are able to visit other parts of the Company obtain a wider grasp and a better understanding of its activities—knowledge which may well be of value in their own special sphere.

Visits are for many purposes. Two may be mentioned as typical; the visit to attend a committee meeting, a conference or for a private discussion; and the more lengthy visit which is perhaps best described in the Army phrase as "a temporary attachment," in which a member of a Division is either on loan to another Division for particular work or is taking a course of instruction in some special process or technique of the host Division. There are many such temporary attachments to Head Office departments for courses, especially for members of the staff who are destined for posts in overseas offices of the Company.

What of the Company's numerous visitors from other industries and from its customers? They come, some of them, for information about its products and services; others seek technical advice and guidance; perhaps some have a complaint, a criticism or a suggestion; and there are, too, the many specialist visitors to discuss with those responsible at Head Office and in Divisions the manifold matters—commercial, legal, financial—that arise in the day-to-day activities and management of a giant enterprise such as I.C.I.

Again, every Division regularly receives visits by organised

groups—parties of students, Press representatives, trainees from other Divisions, gatherings of technicians or members of scientific bodies—to tour a factory, to look over a laboratory or to study some aspect of organisation or technique. A notable example of this type of visit was the occasion during the annual meeting of the British Association at Newcastle in 1949 when 200 representatives went to Billingham to see different sections of the works and research departments. Similarly, not long ago a group of Danish students of architecture visited Paints Division at Slough, while Plastics Division entertained members of the staff-training team of Boots, the chemists. Other Divisions can record many similar visits.

So it is that a record of the visits on any day in any Division shows an astonishing range of callers, as may be seen from the following examples chosen at random from the visitors' books of Nobel and Dyestuffs Divisions and the Northern Region.

Here is a list of Nobel Division's visitors at Glasgow and Stevenston during a single working week. On the Monday there were five visitors, one each from the Development and India Departments at Head Office with a matter of mutual interest to discuss with the Division chairman. The Northern Region office and the Edinburgh Area office each had a representative in Glasgow for sales discussions, while a member of Dyestuffs Division staff arrived on a five-day visit to do with technical matters.

Tube Investments Ltd. had three representatives for discussion on the next day, and two of the London staff of Shell Chemicals arrived for talks of mutual importance to their company and I.C.I. Wednesday brought two overseas visitors to Glasgow, representatives of the Picatiny Arsenal, U.S.A. The same day two of Metals Division staff were having discussions on sporting powders, while elsewhere in the Division a small mission of three from the Central Purchasing Department at Earlsfield was talking about supply matters.

On the Thursday Metals Division had another of its staff at Stevenston, while on the same day Mr. C. J. Cooke, head of Cooke's Explosives Co. in North Wales, was making a general factory visit. Next day Dr. Traill welcomed Professor Astbury of Leeds University to Stevenston, and on the following Monday Lord Bilsland, chairman of the Scottish Council for Development and Industry, visited Dr. McDavid, chairman of Nobel Division, in Glasgow.

Twenty-one visitors in six working days! And this figure takes no account of many inter-factory visits and other brief calls. When it is remembered that similar visits are taking place every working day throughout the year it will be evident how strong is the thread which links the different units of I.C.I., and how close is the liaison between the Company and industry in general.

In the I.C.I. Regions the procedure is very largely reversed, since it is part of the work of the sales representatives to visit the customer at his premises. Nevertheless Regional and Area offices receive their quota of callers, as shown by the following examples from the Northern Region.

A gentleman from overseas, visiting a local exhibition, wishes to be shown over a works engaged in some particular branch of the textile trade. He approaches the Regional office, which is able to arrange a meeting between the visitor and a customer —with ultimate benefit to all parties.

Again, a customer who re-packs many thousands of tons of an I.C.I. product for the retail trade has difficulty with the supply of containers. He visits a Regional or Area office to discuss the problem, and it may be that one of the Divisions can assist or that the Region knows just the right outside firm to meet his needs.

There is also the case of the visitor representing a firm which is in need of a product not available from I.C.I. through the normal channels. The Regional office may know a customer from whom the required material can be borrowed at short notice.

Typical of a visit to the Northern Regional Explosives Department was one which dealt with tunnelling operations in the Bowland Forest tunnel scheme (described in *Information Notes* No. 37). In this case the chief engineer of the Cementation Company and his assistant visited the manager of the Explosives Department to discuss the project. During the visit all aspects of the tunnelling operations were discussed—the most suitable types and sizes of explosives to be used, likely consumption of explosives per cubic yard of rock excavated, the question of vibrations from blasting, drilling problems, storage and delivery. Thus in a two-hour visit all aspects of the job were discussed.

The scope of activities within the Regional office and the part played by personal visits are well defined in the following remarks by the Northern Regional Sales Manager of Dyestuffs Division:

"One of the most important duties of the Region is to promote the good name and reputation of the Company, and this is to a large extent a personal matter not to be achieved by any set programme or timetable. The opportunities must be taken as they arise and are largely dependent upon the wishes of the customer, or should be.

"Visits to this Regional Office are not very frequent, but they vary widely in their nature. During the past few weeks, for instance, many overseas visitors have attended exhibitions here. Some wished to visit works in this country; where possible these are arranged and a meeting takes place in the Regional office for introductions, etc. This is an indirect Regional service. The Office of Information desires to visit a works at short notice. Can we help? We do. Again an indirect service. A customer is considering the erection of a new power plant. Can we arrange for his engineers to visit one recently opened? Yes, we can and will. A large buyer wishes to discuss his requirements for next year. He has branches in various areas. In such cases he visits the Regional office and, apart from detail, a broad exchange of views takes place concerning his particular trade."

The Dyestuffs Division, with its varied range of products—the Division manufactures more than 6000 different commodities—has perhaps more visitors than any other part of I.C.I. Its headquarters at Hexagon House, Manchester, are a focal point for visitors from all over the world, and the variety of subjects discussed with its technical and administrative staff covers almost every aspect of the complex work and organisation of I.C.I.'s great part in the British dyestuffs industry.

On five consecutive days towards the end of last year fifty-one visitors came to Hexagon House; in addition, on one of these days there was a visit by a party of nine Austrian technical students. But mere figures tell only part of the story. Let us see who some of these visitors were, and who they came to see.

First visitor, then, on 21st November, 1949—a day chosen from many similar busy ones—was a representative from within the Company to call on Distribution Department. Then from Wilton Works came Mr. Kerr for an appointment in the Division Engineering Department. Mr. Demuth, chairman of the Division, then received Mr. Marx of Balliol College, Oxford, while Mr. Weston of Overseas Sales Department was engaged with a representative of the Norwegian firm of Den Kemiske Fabrik. Meantime, in the Dyehouse, Mr. Mitchell was discussing problems with two representatives of Stevensons (Dyers) Ltd. of Derby, while his colleague Dr. Vickerstaff was visited by Mr. Preston of the College of Technology, Manchester.

The party of nine young Austrian technical students, accompanied by Dr. Muller-Sturnheim of the British-Austrian Chamber of Commerce, arrived for their tour of the Dyehouse. In Miscellaneous Chemicals Section Mr. McArthur was visited by Mr. Norman of Southern Region, and in Home Sales Department Dr. Samuels was having a discussion with a representative of the British Coated Board and Paper Mills of Pontypridd. Mr. G. White, Chief Colourist—who naturally has a very large list of callers in the Dyehouse—was seeing Mr. Crone of the firm of James Templeton and Co. of Glasgow, while in Division Engineering Department Mr. Sachs had an appointment with Mr. Swarbrick of the Temple, London.

On other days it is much the same at Hexagon House—a flow of callers representative of almost every aspect of British industry and commerce, typifying the all-importance of the personal touch.

TESTING SHOTGUN CARTRIDGES

Contributed by Metals Division

ANYONE who watches the process of making shotgun ("sporting") cartridges will be impressed by two things—first, the number of separate operations (more than 120) needed to produce the finished article, and second, the meticulous testing and checking which accompany every stage of manufacture. But with so many separate components involved, and bearing in mind the varying conditions under which the product will be used, it is not considered sufficient to rely on the accuracy of these intermediate examinations, and so a series of additional tests is carried out on a sample of finished cartridges taken from the production line. These tests are designed to satisfy the manufacturer that his cartridges are safe, effective and reliable.

Among the points to which special attention is given at this stage are ignition, pressure, velocity, pattern and recoil.

The percussion cap (the copper cap in the head of the cartridge which is struck by the firing pin of the gun when the trigger is squeezed) must produce a flame of the right heat and size to ignite the powder correctly; and the powder must burn regularly and progressively to give the required pressure, the sole purpose of which is to propel the charge of shot up the barrel with the right velocity. Fast-flying pellets are obviously needed, to reach the target quickly; moreover, the speed at which the charge travels affects the degree of penetration. But penetration needs the help of pattern, for the shot pellets (of which there may be as many as 400 in a single cartridge) must be evenly spread out.

Inseparable from the action of propelling a shot charge is the recoil of the gun. This is directly affected by the weight of the gun and the velocity and weight of the material (shot, wads and gases) ejected from the muzzle when the cartridge is fired.

What are known as ballistic trials are made in a free-swinging "pendulum" gun; the firing of a single cartridge gives accurate data about pressure, velocity, time up the barrel and recoil.

Velocity is measured over a distance of 20 yards by means of a chronograph, an instrument capable of measuring accurately very small time-intervals—two or three thousandths of a second in this instance. Similar apparatus is used to measure "time up the barrel" (the time which elapses between the striker pin hitting the percussion cap and the exit of the shot from the muzzle). At the same time details of fumes, smoke and residues can be recorded.

For observing the pattern or spread of the shot, cartridges chosen at random are fired at a whitewashed plate on which is mounted a 30 in. diameter ring; the pellet marks are counted and examined for distribution. When related to the total number of pellets in the charge, an accurate picture can be built up of the effect of firing in the field.

When all these and other routine tests have been added to the checking and inspection of components at every stage of manufacture. both before and after loading, it must be agreed that the maker has done all he can to ensure the reliability of his cartridges.

MEDITERRANEAN MEDLEY

Even the most serious and important missions have their lighter moments when the cares of business can be laid aside. To Mr. L. H. F. Sanderson, Overseas Personnel Officer, we are indebted for the following impressions of a light-hearted interlude during a recent voyage from India, which Mr. Sanderson has been visiting.

IF you should find yourself at Istanbul on the way home from the Middle East, weary with official visiting, I can confidently recommend a peaceful sea voyage by the S.S. *Istanbul* of the Turkish State Lines, or the *Devlet Deniz Yollari* as they prefer to call it. After being catapulted in an aeroplane from place to place it is very restful to see something more of one's fellow men than their heads sticking over the top of the seats in front.

The captain of this ship was exceptionally hospitable and sensitive to the comfort of his passengers. He not only gave one the freedom of the sacred precincts of the bridge but, duly abstemious himself, provided a midnight glass of brandy to keep out the cold.

One is so accustomed to hearing everything British decried that it was some consolation to hear the Turkish captain and the Greek pilot constrained to speak English as their only common language. The captain had unsuspected resources in the English language; some at least he may have learned from the Royal Navy, to judge by his comment on the Greek pilot after an unnecessarily lengthy wail on the ship's siren: "Dees blody fellow. He make so noisy. He is headache for me!" (If the ancient sirens resembled this one, Ulysses' temptations must have been exaggerated!)

It is very desirable to learn Turkish before going aboard. In your cabin is the single legend:

Dikkat
Tehlike vukuunda binegeginiz
can sandali 4 no ludur can kurtaran,
yelekleriniz ile birlikte battaniyenize de
almayi unutnayiniz

This, apparently, is a pithy instruction on life-saving procedure but not very helpful if you happen to be in a hurry. Also, all the Turkish stewards bow from the waist at every opportunity, but their linguistic attainments were so limited that "yes," "oui," "si" or "ja" were equally incomprehensible to them.

If you call at Piraeus and have sufficient currency there is plenty of time to go to Athens by car; if without currency and you are sufficiently nimble, you can still do the journey by electric train—the latter easily outdoing London's Bakerloo Tube in the rush hour, with divers Continental odours thrown in. I was greatly impressed at one station by the struggles of a Greek priest to extricate himself from the train. He would have made a good front row forward, and his egress did not pass without comment, one indignant fellow passenger letting fly a spate of Greek in which the only recognisable words sounded like "pope—papa—papa."

One of the four days at sea was unfortunately a day of storm and stress, in which few survived to appear in the dining saloon; for a particularly bad sailor to do this and, moreover, to complete lunch with *tartelette à la créme Chantilly* was to me a source of some personal satisfaction and to the captain a puzzling phenomenon; let in to the pharmaceutical secret, he autographed a photo of the ship and dedicated it "to our best sailor, thank to pill."

If the approach to Naples was attractive, thanks largely to the captain's solicitude for his passengers in taking them close up to and along the coast of Capri, Vesuvius was particularly disobliging, providing neither smoke to impress nor a railway to the top; and so in Mediterranean air and sunshine off to Pompeii. It is a pity that nearly all the world's most famous monuments are guarded by phalanxes of sellers of undesired and undesirable wares. Pompeii goes one better, for there you will also find that well-known comedy character with his half-whispered "You buy feelthy postcard?" In this case they are reproductions of some of the less-creditable efforts of Roman artists in interior decoration when a drawing room really was a withdrawing room.

Another day of cruising past the rugged grandeur of Corsica and lonely Elba, calling to mind the beginning and the near-end of a troublesome figure; and so to Marseilles, where the excitement, distress and disorganisation among dockers, police and customs officials might have led the innocent traveller to believe that never before had French officialdom been faced with the problem of disposing of sixty passengers and their belongings. However, in a mere two and a half hours the problem had been squarely faced and dealt with, and one went off to eat mussel soup.

An R in the month

By Hugh Munro (Nobel Division)

IT was in the early '30's. There was an R in the month. There was also an O in the bank balance. So when Johnny came talking temptation I listened, as we say in Ayrshire, with ears flapping. His proposition sounded literally like picking up money.

"It's the wulks," said Johnny. "Davy and Wullie and I are for a go at them this week-end. Are you game ?"

"If they're boiled," I said agreeably, "although they are thirsty eating. Who's throwing the party ?"

Johnny let the pleasantry pass. The world has never produced a more earnest type than a dole-drawer on the make.

"Davy and Wullie have got a bivvy tent and I've got a storm lantern. You bring a fryin' pan, and we'll be all set," he said. "The idea is to whip over to Arran on the Friday mornin' boat frae Ardrossan and chase every tide between then and the following Wednesday. If we get any sort of prices we should make enough to put us all in the dough for a fortnight."

"Sounds pie," I said; "but if the Means Test man gets wind of it you'll put us in jail for life. However . . ."

The scheme hinged on the established Billingsgate practice of accepting consignments of fresh shellfish from notable points around Britain's coast. By happy chance Arran—majestic Firth of Clyde island set only a few miles distant from Ardeer Factory and our Saltcoats home—produced a variety greatly esteemed by London's gourmets, whether of the kind who frequents the discreet spots of Soho or the flare-flooded haunts of Hoxton. It was not hard to convince me that the expedition held expectations of profit.

My immediate problem was to make Arran landfall without loss of current revenue. Indeed, current revenue—because it was so little—was very necessary if Arran landfall was to be made at all. The situation called for a third-party consultation. It called indeed for the co-operation of Tam.

Tam is not his real name. Officially he was the gentleman who exercised watch and ward over the trickle of national expenditure which at that time found its way into my Friday pocket. He was of the leaven that sweetens the bitter bread of bureaucracy.

"It's all against the rules," said Tam. "You're supposed to sign here at the proper time. And anyway, you're definitely not supposed to earn money when you're drawing dole." But none the less he let me sign the next day's (Friday's) register and then, putting his hand in his own pocket, produced a ten-shilling note, two half-crowns, and a threepenny bit—my exact week's allowance in advance. "You'll all get me hung," was his only reaction to my fervent thanks.

On the Friday everything went to plan. With my frying pan and Johnny's storm lantern hitched hiker fashion to the outside of the smartly rolled bivouac tent, plus the comforting knowledge of a huge slab of a famous local butcher's prime mince sausage rolled inside—Wullie was a butcher's assistant in his off-dole moments—we clattered aboard the Arran steamer at Ardrossan with all the optimism of Old Forty-Niners (last century models).

It was February, the air sharp as an Appeal Board's questionings, the Firth flat as slate and the sky as grey as most Appeal Board's verdicts. Yet we sang. We sang "Stormy Weather" and "River stay 'way from my door" and all the other mournful dirges of the period. But we sang them joyously because the deck boards were live under our feet and the horizon wide on our bow.

Winter's keenest kiss swept down the snow-clad corries to greet us in Lamlash Bay. As we clumped up the

almost deserted jetty hearing the deep-boomed bellow of the departing steamer I, for one, felt a townsman's pang at this signal of life-line parted. The sight of my frying pan dangling at Wullie's back and remembrance of the concealed twenty-four inches of Lorne sausage—our sole provision—did not reassure me.

We were the only arrivals at Lamlash that day. And as we strolled up the village it became clear that the few natives we met with remarked our intrusion with strong reserve. Johnny, whose grandmother had been an Arran woman and who was moved by clan loyalties, swore the atmosphere was simply due to our arriving at the wrong season.

"Wi' the wrang gear, ye mean," said Davy. "A cabin trunk and hauf a dozen suitcases'll win a stranger the freedom o' the island anytime. Oor bivvy'll be lucky to win us the freedom o' the foreshore."

After wandering around we asked a field worker's advice on camping sites. The man straightened himself and measured our shapeless flannels and workaday sports

jackets with extreme distaste. "Oh aye," he said at last with all the lordly contempt of a McNeil of Barra giving the world permission to dine. "Ye can pitch doon there —and we'll see how ye behave yoursels," and he waved towards a scrubby hillock of sand bleak on the seaward side of the road and plainly lapped by high-water seaweed.

"Thanks for nothing," said Wullie with quick Ayrshire arrogance. "If we feel like biding there we'll ask the King—it's his land."

Whether Wullie's statement of royal title on tidal feu was correct none of us knew or cared, but it crushed the cottar. In lowering silence he watched our jaunty progress out of sight.

We pitched our tent on the lee of a hill by Clauchland Point. The friendly farmer who gave us permission also thrust on us a heaped bale of clean straw to ensure that our groundsheet would have warm foundation. We were glad of that straw before next day's dawn.

I am city born. My childhood litany was iron welkin of tramcar and rivet hammer. But never until the chill moment when Wullie handed me a gunny sack and we four squelched through clammy masses of red popping weed in the wake of the falling tide, did I realise the gulf that separated me from my coast-born companions. Davy and Wullie and Johnny splashed through those icy pools with evident enjoyment. Every step I took seared my spirit with the paralysis of Dante's frigidly damned. And every yard brought realisation that the illusion one has from the mainland of Arran's sheer rise from the sea is a hellish mirage. When whelk-gathering in February its foreshore stretches flat leagues into misery. Of course we had equipped ourselves with old footwear as protection against cuts from the rocks, but long before I reached the water's edge my wet extremities were so numb I wouldn't have noticed if I'd lost a foot off from the ankle. My companions only chuckled at my agony and promised me real rigours when we reached "the beds."

Professional whelk-gathering is not to be confused with the antics of Pa, Uncle Bertie, and Wee Sonny, poking and paddling in the summer shallows with Ma benignly knitting on a deck chair beside the lunch basket. Your "money for wulks" man is conditioned by time, tide, and personal toughness. Following the sea down to its lowest ebb—and probably a few yards beyond—he plunges elbow deep in the weediest pools where he knows the shellfish cluster thickest. Gathering with practised speed, he moves slowly up with the incoming waters. That year the pools at Clauchland Point were filled with whelks as big as walnuts. We scooped them up in handfuls. During each tide's harvest Davy and Wullie and Johnny never straightened their backs, and we rose and worked the night tides too with the storm lantern. After the first tide's experience I never straightened my back either—indeed, I was convinced I'd never straighten it in my life again, but actually a month after the week-end's whelking I was walking nearly normal once more.

When dusk came that first evening we nominated Johnny to light a fire and fry the teatime sausage. Wullie and Davy and I walked the short distance into the village to buy bread. We also took a sack each because, as Davy waggishly observed, not being as far-sighted as the Stevenston man who reputedly packed the electric fire in the picnic hamper, we would have to manage the next best thing. And the next best thing was coal. A log fire of course, which was ours for the gathering, is the romantic requisite for the simple life. But then, as now, in bivvy or bungalow, a bag of brushwood is a poor barrier to build between yourself and the watches of a winter's night. How often, in these later days of full employment and empty bunkers, I sigh back to the fire Wullie and Davy and Johnny and I built on Clauchland Point! Its like today would have all the calorific committees of the country foaming at the mouth. We, poor discards of depression, took it for granted.

We gathered our coal from the shingle beside Lamlash Pier, where the little West Coast freighters immortalised

in Neil Munro's "Para Handy" beached to bunker between tides. With replenishment it made us a bonfire that burned continuously during our stay and was an unfailing beacon of cheer in our farthest and darkest ebb-tide darg.

When we staggered back, Johnny, a snub-nosed, farthing-faced youth, was beatific. The smell from the pan was of heaven too. I looked in. Shouldering the beautiful golden sausage slices were even more beautiful golden-centred eggs.

"Where d'you get those?"

"Fun them," said Johnny cherubically.

"You found them!" I said. "Where?"

"In a nest. Sixteen o' them."

He displayed the remainder in proof. Davy, Wullie and I wasted no breath in further query. But when on the two following days Johnny blandly repeated the miracle I felt it was time to call a halt, and said so.

It really was a great week-end. That evening, after a sleet squall had blown over, the stars came out. You have to look up from the foot of mountains to measure the height of the stars. And then, silently, a liner slipped in from the outer seas to rest in the safe shelter of Lamlash's age-old bulwark, Holy Isle. Is there any other spectacle to equal the glory of a great ship ablaze with lights?

In the morning I collected my bags of whelks from the tidal pool in which we had stored our catches to preserve them alive against the hour of shipment. My pals had already gathered more than I, but despite my urging refused to come home that day.

"No fear!" was their sentiment. "Next Buroo signing day's no' till Wednesday—we can double oor takin's by then."

"You think I'm a sissy?" I said. "Okay; believe me, you're the narcissi."

"The who?" gulped Wullie and Davy.

"We'll read it up when we get hame," said Johnny.

"You will," I promised; "you will."

On a barrow we borrowed from the pier-master they helped me wheel my booty to the jetty. We weighed it and found I had gathered over twenty stone of whelks. Wullie skilfully tied a Billingsgate auctioneer's label to the bags, and that was the last I saw of them. But I was assured they would be in London by express delivery next morning. My frying pan I left with the boys as a souvenir, and I added a further solemn admonition on the dangers of an egg diet.

It would be about a week later when next we all forgathered at a Saltcoats street corner.

"Well," beamed Wullie; "ye'd get your cheque this morning? No' bad, eh?"

"Not bad at all," I agreed.

"I'd a couple o' quid and Davy got thirty-eight bob."

"And Johnny?" I asked curiously.

"Och, he'd only thirty-three—that's what he gets for gaun bird-nestin'."

We all laughed uproariously until someone said diffidently, "Peety you went away so arly—you can only have about fifteen bob?"

For answer I fished in my pocket and spread my cheque. For a moment there was stunned silence. And then Johnny said, "Where's that ruddy fryin' pan noo? Tak' me hame and hit me over the heid wi' it!"

I couldn't argue. After all, theirs was salt-water heritage, as you might say. My landlubberly ancestry was peopled with mere stoop-shouldered riveteers and bow-legged street hawkers. But much favoured among these latter had been a tenement lyric oft heard by me in childhood and never afterwards forgotten. "If ye want the week's best price for ye're fish or fruit, tak' them to the market early."

My cheque was for three pounds fifteen.